



Your comments and suggestions on the operation of this software are welcome. Please address them to:

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Introduction

The TrendWorX32 Configurator is used to create and maintain a tag database for use by the TrendWorX32 SQL Data Logger. Its main function is to perform configuration for data logging. In addition to simple tag configuration, the Configurator is used to create and maintain a process-area hierarchy and to group tags into one or more named configurations to support servers running on multiple network nodes.

The TrendWorX32 Configurator receives field data from any OPC-compliant data access server and performs configuration.

Using the TrendWorX32 Configurator, you will perform the following basic steps:

1. Open a new configuration for data logging.
2. Configure a database group, a logging group, and tags.
3. Download the configuration to the server by using the **Make Active** command on the **File** menu.
4. Start or stop data logging.

The server can read its configuration information from a Microsoft Access .mdb file, provided the relevant driver is installed on your local machine. You can select either a machine source or a file as a data source for the Configurator. This means that you have the option of selecting a data source that need not necessarily reside on your local machine. The Configurator can retrieve data either from a database on your PC (machine source) or from a database that resides on the network (file source).

About the TrendWorX32 Configurator

The Configurator application ("Twx32Cfg.exe") is used to make changes to the database file that the server uses for configuration information. This file is the Configurator component of the TrendWorX32 SQL Data Logger. The "Twx32Cfg.exe" file is installed in the GENESIS32 "Bin" directory.

The TrendWorX32 Configurator has enhanced multiple configuration support. The TrendWorX32 SQL Server stores its configuration data in a database file (default is .mdb file). The TrendWorX32 Configurator is interfaced to the TrendWorX32 SQL Data Logger through a COM interface. Through this COM interface, you can download configurations to the TrendWorX32 SQL Data Logger, start and stop data logging, and retrieve status information.

The configuration data are stored by default in a .mdb file. The ICONICS GENESIS32 installation utility installs a default configuration database, called "Twx32.mdb," which is located in the GENESIS32 "Bin" directory. It also installs a template file for configuration databases, called "Twx32Cfg.src," under the GENESIS32 "Bin" directory. By copying the file to "MyName.mdb," you can create a new configuration database. The configuration database default file and template file contain all of the defined configuration tables as well as all the used restrictions and constraints. These files should never be altered because they can violate database integrity.

Starting the TrendWorX32 Configurator

There are three different ways to start the TrendWorX32 Configurator:

1. From the Windows **Start** menu select **Programs > ICONICS GENESIS32 > TrendWorX32 > TrendWorX32 Configurator**.
2. Open the "Twxcfg.exe" file in the "Bin" directory.
3. In the TrendWorX32 Container, select **TrendWorX32 Configurator** from the **Tools** menu, or click the **TrendWorX32 Configurator** button on the main toolbar.

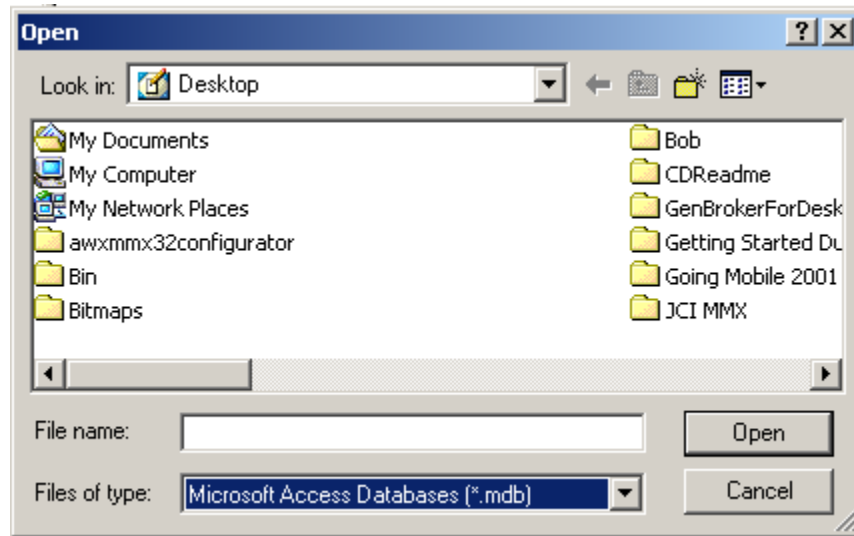
Important Note

The TrendWorX32 Container has security protection on starting the TrendWorX32 Configurator. However, the TrendWorX32 Configurator itself is *not* interfaced to the ICONICS Security Server. Therefore, you should exercise caution when starting the Configurator because the Configurator enables you to stop data logging or even delete currently used configurations.

Once you have started the Configurator, one of the following will occur:

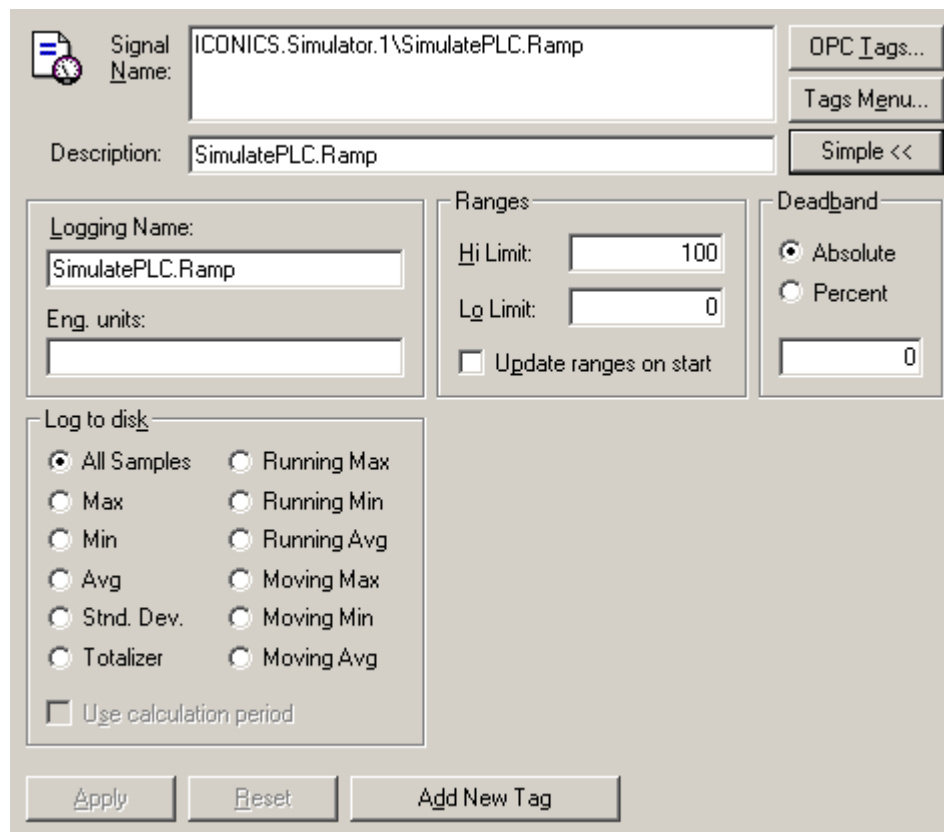
- An empty configuration file will open.
- The last-used database file will open in the TrendWorX32 Configurator.
- A message box may appear, prompting you to upgrade the existing configuration file to the latest version.

To open a different .mdb file, select **Open** from the **File** menu. This opens the **Open** dialog box, shown below, which enables you to browse for configuration files.



Selecting a Configuration Database

To access the configuration file interface, select a .mdb file. The following dialog box will be displayed in the right-hand pane of the Configurator screen.



TrendWorX32 Configuration With a Loaded Configuration Database

Configuration

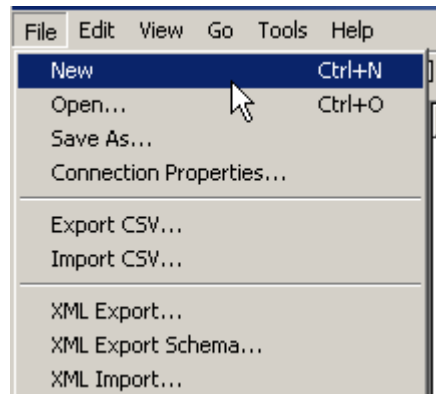
The configuration layout of the TrendworX32 Configurator is quite similar to that of an OPC server configuration. The key concept here is the **database object**, which replaces the **device** of the OPC data server configuration.

A **configuration** is the name given to a block of information to be used by a server. Only one configuration per node can be active at one time. Only one server per node can run at one time. The database can store multiple configurations.

Creating Configuration Databases

The Configurator provides a Configuration Database Wizard for creating new Microsoft Access and SQL Server configuration databases. To create a new configuration database in the Configurator:

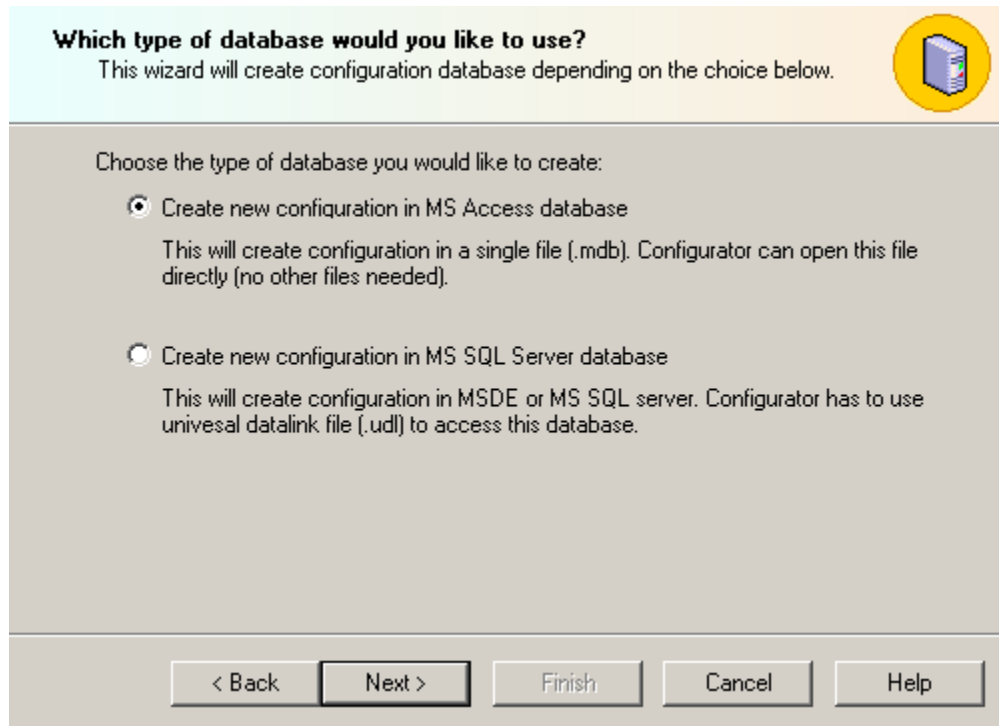
1. Select **New** from the **File** menu, as shown in the figure below.



Creating a Configuration Database

2. The introduction screen for the Configuration Database Wizard appears. Click the **Next** button to continue.
3. You have two options for creating your new database, as shown in the figure below:
 - **Create a new Microsoft Access configuration database:** For a Microsoft Access database, the Configurator uses a single .mdb file
 - **Create a Microsoft SQL Server database:** The Configurator uses Universal Data Link (.udl) files to connect to a Microsoft SQL Server or MSDE database.

Select the database type you want to create, and then click **Next**.

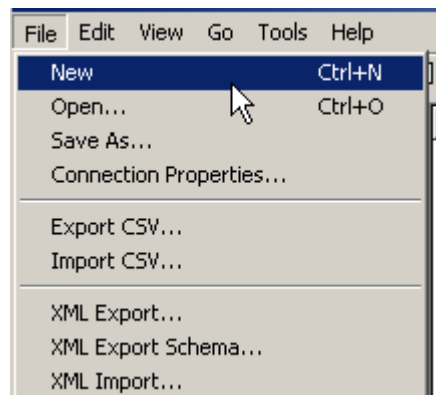


Choosing the Type of Database To Create

Creating a Microsoft Access Configuration Database

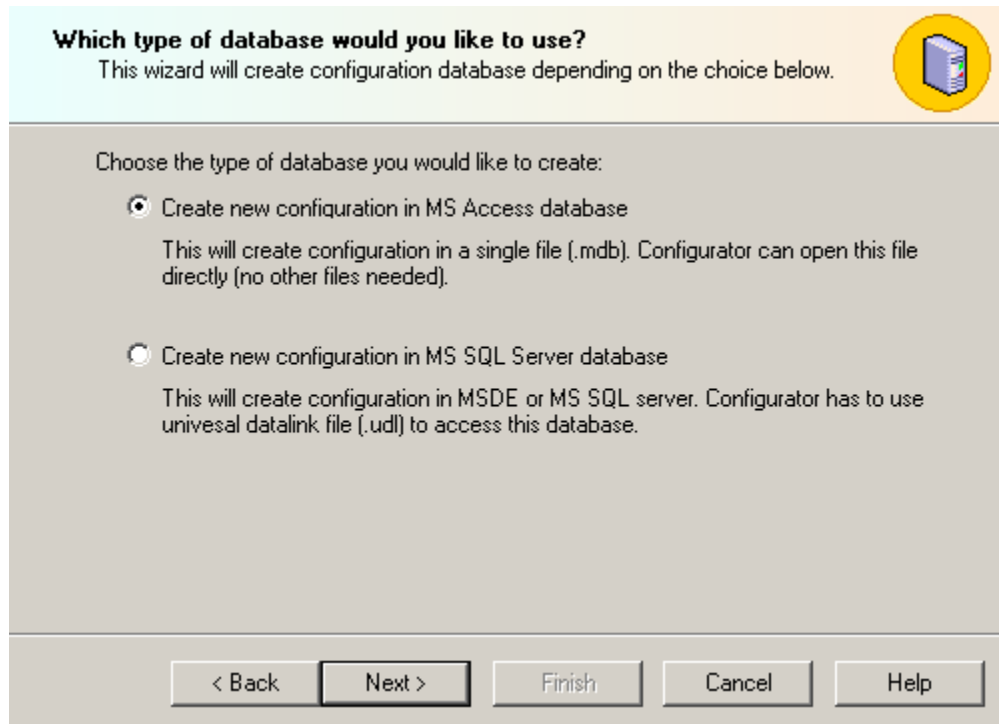
To create a new Microsoft Access configuration database in the Configurator:

1. Select **New** from the **File** menu, as shown in the figure below.



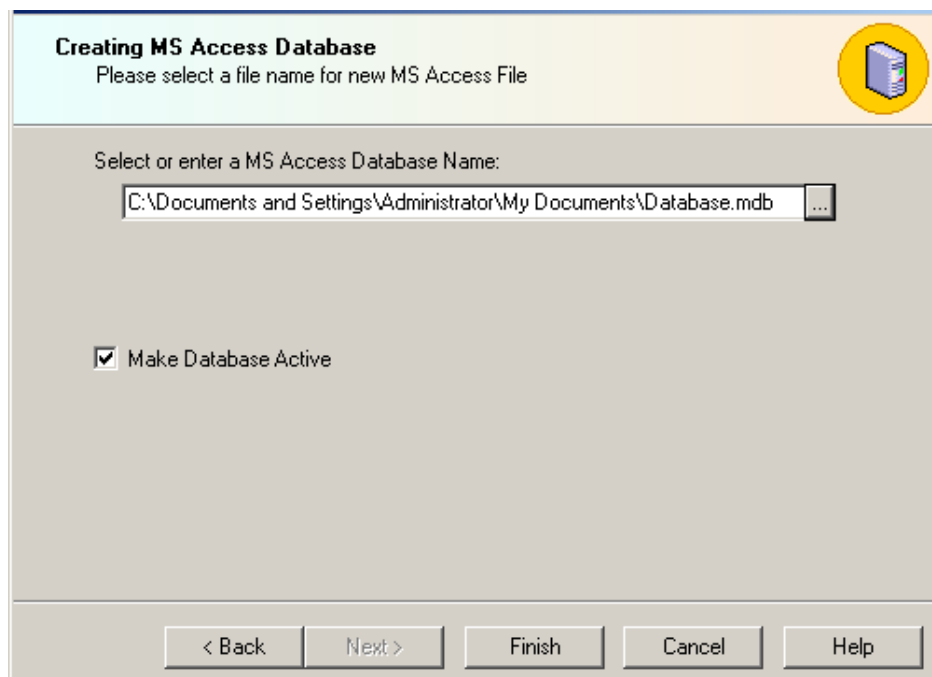
Creating a Configuration Database

2. The introduction screen for the Configuration Database Wizard appears. Click the **Next** button to continue.
3. You have two options for creating your new database, as shown in the figure below. Select **Create new configuration in MS Access database**. Click the **Next** button to continue.



Creating a New Microsoft Access Database

4. Specify the directory path and file name for the new database, as shown in the figure below. Click the ... button to browse for a directory. If you want this new database to be the active configuration database, check **Make Database Active**.



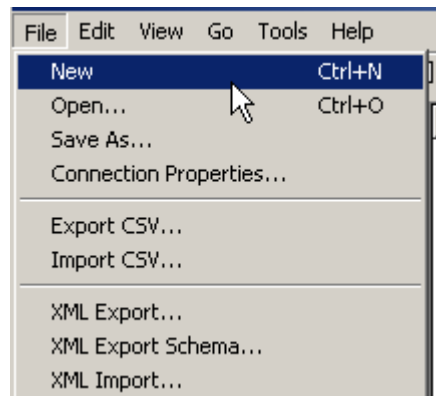
Naming the New Access Database

5. Click the **Finish** button. The new database is created and opened in the Configurator.

Creating a Microsoft SQL Server Configuration Database

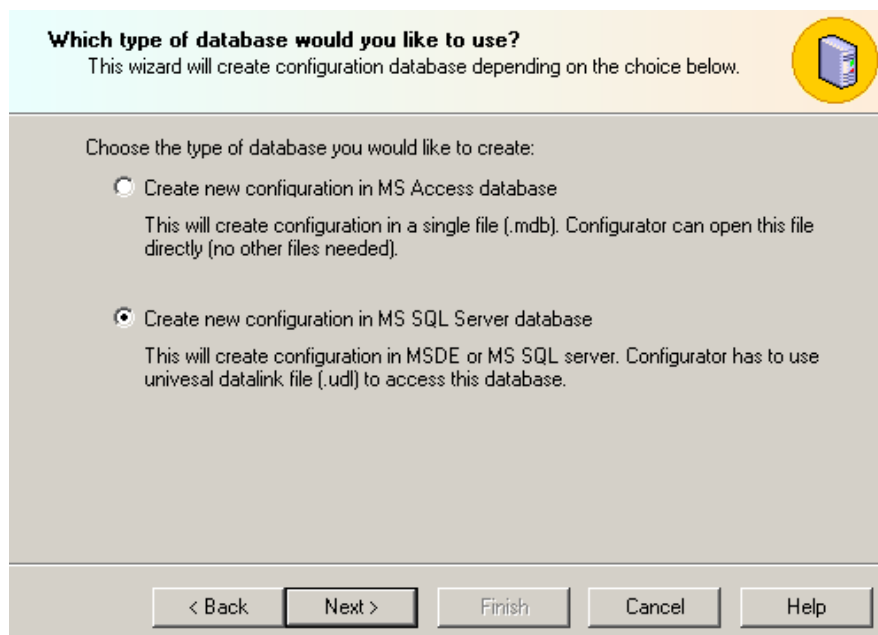
To create a new Microsoft SQL Server configuration database in the Configurator:

1. Select **New** from the **File** menu, as shown in the figure below.



Creating a Configuration Database

2. The introduction screen for the Configuration Database Wizard appears. Click the **Next** button to continue.
3. You have two options for creating your new database, as shown in the figure below. Select **Create new configuration in MS SQL Server database**. Click the **Next** button to continue.

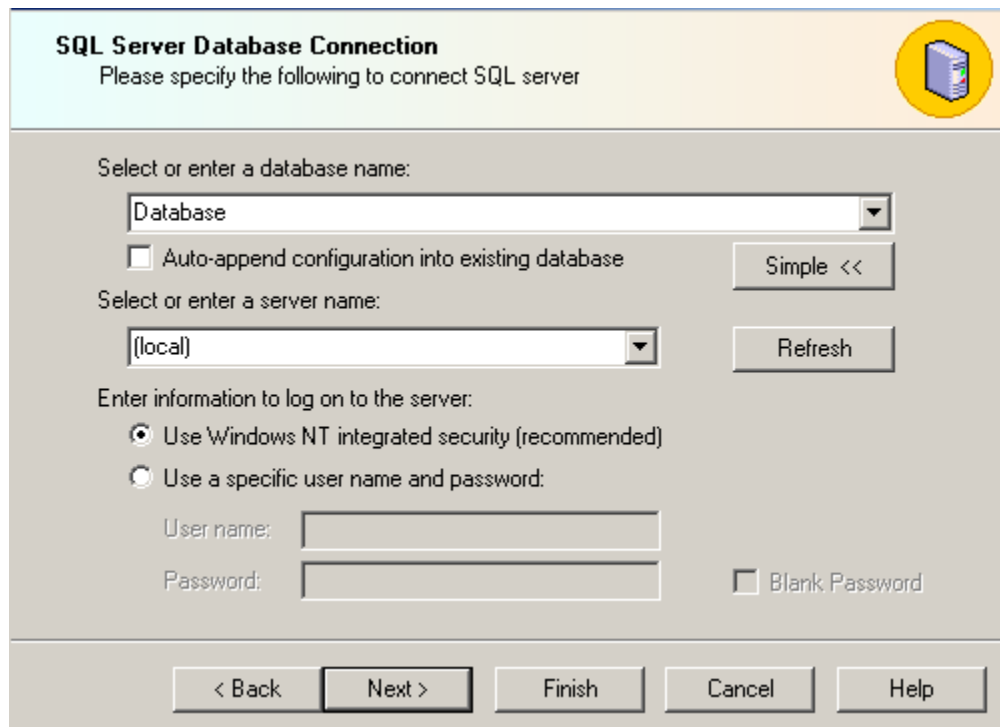


Creating a New Microsoft SQL Server Database

4. To connect to a SQL Server database, either select an existing database from the **Database Name** drop-down list, or type a new name to create a new database, as shown in the figure below. If you choose to use an existing database, you have the option of adding (auto-appending) the configuration to the existing database. (For more information about the auto-append function, please see "Adding the Configuration to an Existing Database.")

In the **SQL Server Name** field, select the local SQL Server on which to create the database. If necessary, enter a user name and password to log on to the SQL Server. (It is recommended that you use Windows NT integrated security.)

Note: Usually you have only one instance of SQL Server running on the local node. In this case, the drop-down list under **SQL Server Name** has only one option: "(local)." However, it is possible to run multiple SQL Server instances on the local node, in which case the **SQL Server** field lists all those SQL Server instances: "(local)" for the default instance and "node_name/instance_name" for all others. The drop-down list may show SQL Server instances on other nodes as well.



SQL Server Database Connection
Please specify the following to connect SQL server

Select or enter a database name:
Database

☐ Auto-append configuration into existing database

Select or enter a server name:
(local)

Enter information to log on to the server:
☒ Use Windows NT integrated security (recommended)
☐ Use a specific user name and password:
User name:
Password: ☐ Blank Password

< Back Next > Finish Cancel Help

Connecting to a SQL Server Database

5. Specify a directory path location in which to create the database, as shown in the figure below. You can either use the default SQL Server database folder, or you can click the ... button and browse for a specific folder.

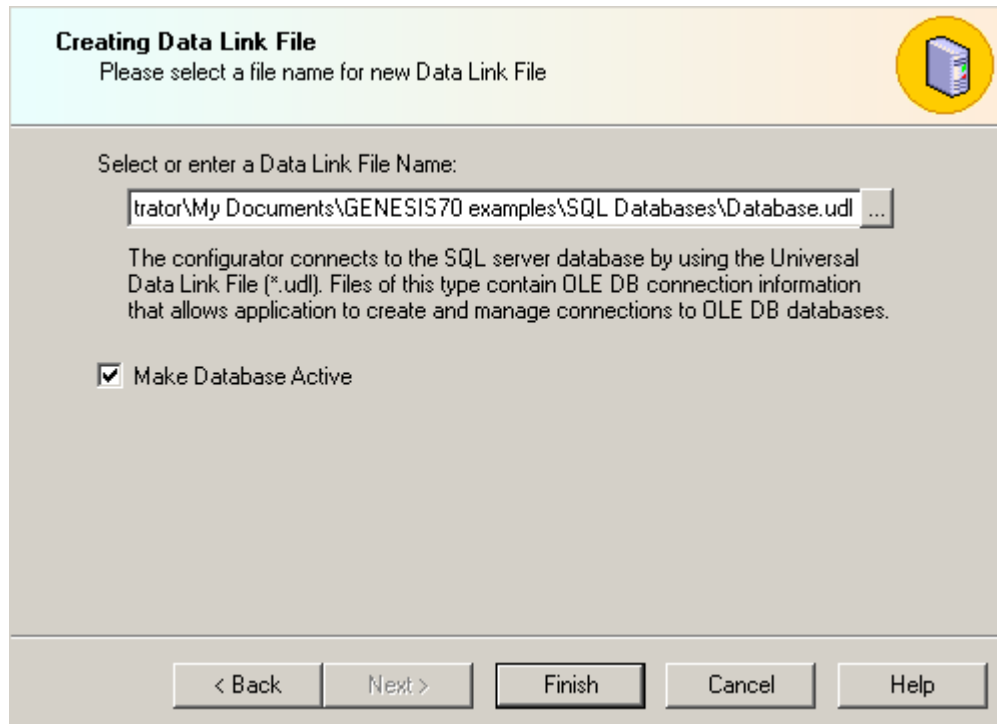
Specifying the Database Location and Properties

Under the **Database Properties** section, specify an initial size for the database, which should be as large as possible. You can also specify a **Database Growth** option (in megabytes) or as a percentage of the total size. MSDE servers are capable of growing the database on the fly to store more data. However, if this operation is performed frequently, the overall system performance may decrease. Choosing an initially large database size and a corresponding database growth option can drastically improve system performance.

Under the **Log File Properties** section, you can also modify the settings for the database transaction log file. Specify a **Log File Growth** option (in megabytes) or as a percentage of the total size. Again, a sufficient initial size setting can greatly improve performance. The default options should be adequate for most applications with a small to medium size load.

Click the **Next** button to create the new SQL Server database.

6. The Configurator uses Universal Data Link (.udl) files to connect to the Microsoft SQL Server database. These .udl files contain OLE database connection information that allows the Configurator to create and manage connections to OLE databases. Enter a name and directory path for the new .udl file in the **Data Link File Name** field, as shown in the figure below. You can browse for a directory by clicking the ... button to the right of this field. Click the **Next** button to continue. If you want this new database to be the active configuration database, check **Make Database Active**.



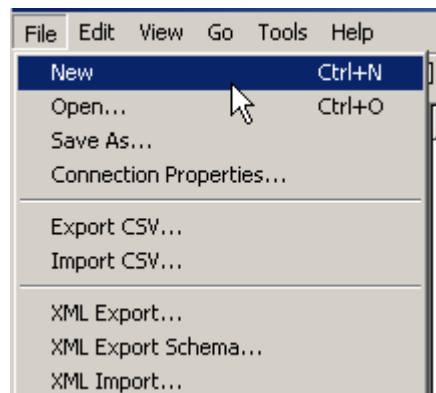
Creating a Universal Data Link File

7. Click the **Finish** button. The new database is created and opened in the Configurator.

Adding a Configuration Database to an Existing SQL Server Database

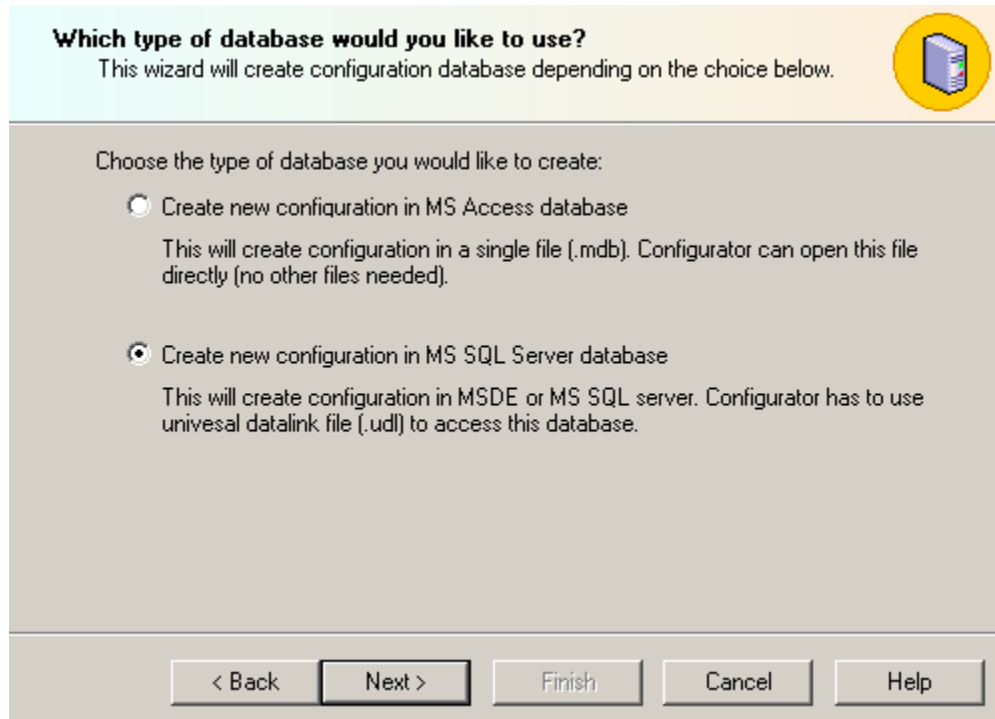
The Configuration Database Wizard also gives you the option to add the configuration database structure to an existing Microsoft SQL Server database:

1. Select **New** from the **File** menu, as shown in the figure below.



Creating a Configuration Database

2. The introduction screen for the Configuration Database Wizard appears. Click the **Next** button to continue.
3. You have two options for creating your new database, as shown in the figure below. Select **Create new configuration in MS SQL Server database**. Click the **Next** button to continue.



Which type of database would you like to use?
This wizard will create configuration database depending on the choice below.

Choose the type of database you would like to create:

☐ Create new configuration in MS Access database
This will create configuration in a single file (.mdb). Configurator can open this file directly (no other files needed).

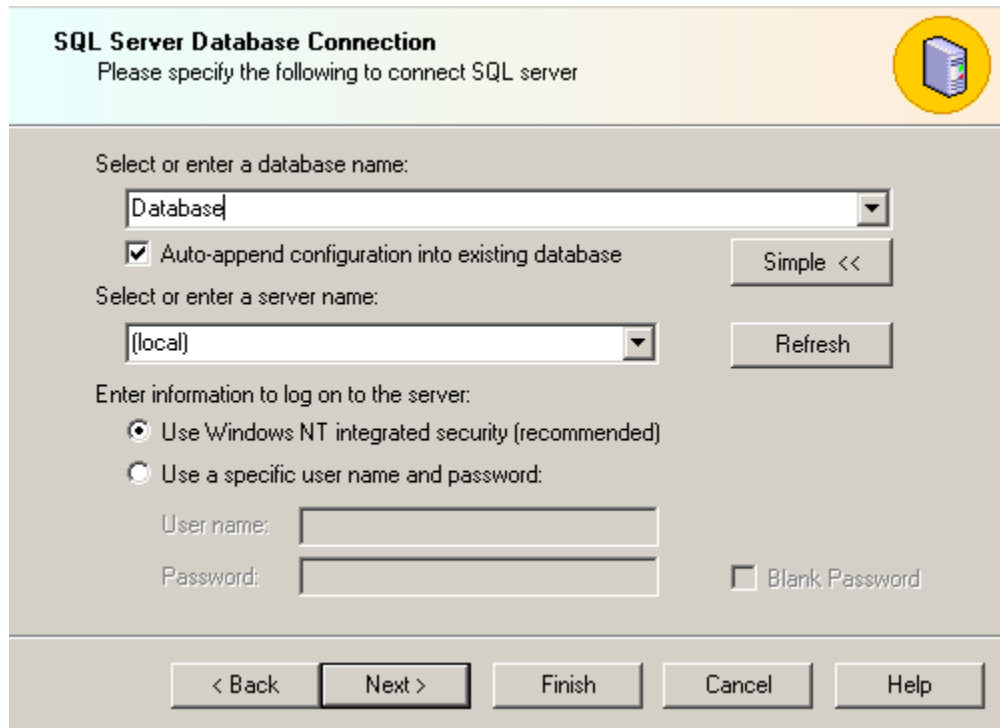
☒ Create new configuration in MS SQL Server database
This will create configuration in MSDE or MS SQL server. Configurator has to use univesal datalink file (.udl) to access this database.

< Back Next > Finish Cancel Help

Creating a Microsoft SQL Server Database

4. To connect to a SQL Server database, select the existing database from the drop-down list, as shown in the figure below. Check the **Auto-append configuration into existing database** check box. In the **SQL Server** field, select the local SQL Server on which to create the database. Type a name for the database in the **Database Name** field. If necessary, enter a user name and password to log on to the SQL Server. (**Note:** It is recommended that you use Windows NT integrated security.) Click the **Next** button to continue.

Note: Usually you have only one instance of SQL Server running on the local node. In this case, the drop-down list under **SQL Server Name** has only one option: "(local)." However, it is possible to run multiple SQL Server instances on the local node, in which case the **SQL Server** field lists all those SQL Server instances: "(local)" for the default instance and "node_name/instance_name" for all others. The drop-down list may show SQL Server instances on other nodes as well.



SQL Server Database Connection
Please specify the following to connect SQL server

Select or enter a database name:

☒ Auto-append configuration into existing database

Select or enter a server name:

Enter information to log on to the server:
☒ Use Windows NT integrated security (recommended)
☐ Use a specific user name and password:
 User name:
 Password: ☐ Blank Password

Connecting to an Existing SQL Server Database

5. If the existing database already has configuration tables, you have the following options, as shown in the figure below:
 - **Select a different database name (recommended):** This option allows you to rename the database without affecting the existing database as well as create a new Data Link (.udl) file.
 - **Use the existing database structure:** This option preserves the content of the existing database and allows you to create a new Universal Data Link (.udl) file.
 - **Override all existing configuration tables:** This option expunges the content of the existing database and allows you to create a new Universal Data Link (.udl) file.

Note: Overriding the database may disable other applications that also use the database.

Click the **Next** button to continue.

One or more configuration tables already exist in chosen database
What would you like to do?

☒ Select different database name (recommended)
This will provide you to specify different database name. Use this option when you are not sure what is the content of chosen database.

☐ Use database structure as it is
This will not change anything in selected database. Use this option if you want to create a new datalink (.udl) file only.

☐ Override all existing configuration tables
Caution: This may cause that other application will stop working. Use this option when you are absolutely sure that the database is not use by other applications.

< Back Next > Finish Cancel Help

Adding the Configuration to an Existing SQL Server Database

- If you chose **Select a different database name (recommended)**, you are directed back to the SQL Server Database Connection dialog box, as shown in the figure below. Enter a new name for the database, and then click **Next**.

SQL Server Database Connection
Please specify the following to connect SQL server

Select or enter a database name:
Renamed Database

☒ Auto-append configuration into existing database Simple <<

Select or enter a server name:
(local) Refresh

Enter information to log on to the server:
☒ Use Windows NT integrated security (recommended)
☐ Use a specific user name and password:
 User name:
 Password: ☐ Blank Password

< Back Next > Finish Cancel Help

Renaming the Existing SQL Server Database

7. Specify a directory path location in which to create the database, as shown in the figure below. You can either use the default SQL Server database folder, or you can click the ... button and browse for a specific folder.

SQL Server Database Creation
Please specify the following to create database files

Specify database files location:

☒ Use default SQL server database folder (recommended)
☐ Use specific folder (local node only)

C:\Program Files\Microsoft SQL Server\MSSQL\Data\ ...

Database files properties: Simple <<

Database File		Log File	
Initial Size (MB):	1	Initial Size (MB):	1
File Grow:	☒ AutoShrink	File Grow:	☒ AutoShrink
☐ In MB	1	☐ In MB	1
☒ By Percent	20	☒ By Percent	20

< Back Next > Finish Cancel Help

Specifying the Database Location and Properties

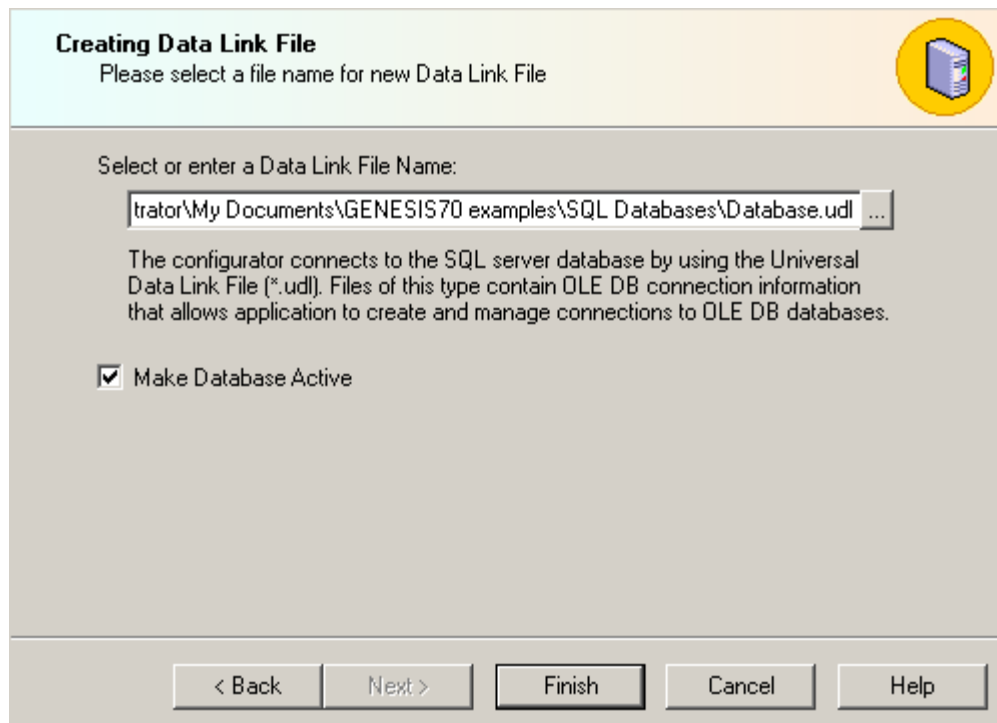
Under the **Database Properties** section, specify an initial size for the database, which should be as large as possible. You can also specify a **Database Growth** option (in megabytes) or as a percentage of the total size. MSDE servers are capable of growing the database on the fly to store more data. However, if this operation is performed frequently, the overall system performance may decrease. Choosing an initially large database size and a corresponding database growth option can drastically improve system performance.

Under the **Log File Properties** section, you can also modify the settings for the database transaction log file. Specify a **Log File Growth** option (in megabytes) or as a percentage of the total size. Again, a sufficient initial size setting can greatly improve performance. The default options should be adequate for most applications with a small to medium size load.

Click the **Next** button to create the new SQL Server database.

8. The Configurator uses Universal Data Link (.udl) files to connect to the Microsoft SQL Server database. These .udl files contain OLE database connection information that allows the Configurator to create and manage connections to OLE databases. Enter a name and directory path for the new .udl file in the **Data Link File Name** field, as shown in the figure below. You can browse for a directory by clicking the ... button to the right of this field. Click the **Next** button to continue. If you want this new database to be the active configuration database, check **Make Database Active**.

Note: If you chose to **Use the existing database structure** or to **Override all existing configuration tables**, you will still need to create a new Data Link file.



Creating Data Link File

Please select a file name for new Data Link File

Select or enter a Data Link File Name:

trator\My Documents\GENESIS70 examples\SQL Databases\Database.udl ...

The configurator connects to the SQL server database by using the Universal Data Link File (*.udl). Files of this type contain OLE DB connection information that allows application to create and manage connections to OLE DB databases.

☒ Make Database Active

< Back Next > Finish Cancel Help

Creating a Universal Data Link File

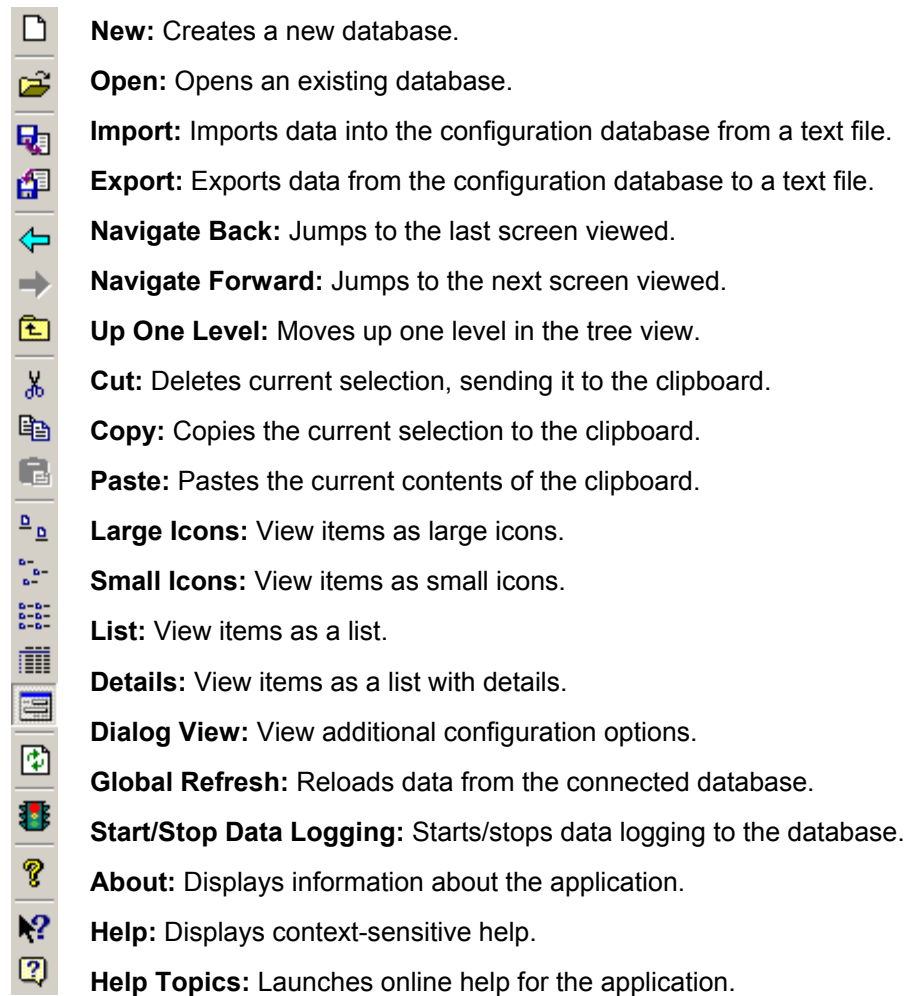
9. Click the **Finish** button. The new database is created and opened in the Configurator.

Toolbars

All actions associated with the TrendWorX32 Configurator can be accessed through the menu commands and the toolbars. To show/hide the toolbars, select **Toolbars** from the **View** menu.

Main Toolbar

The **Main** toolbar of TrendWorX32 Configurator, shown in the figure below, contains the following command buttons. For more information on these commands, see the **Menus** section.



Configuration Toolbar

The **Configuration** toolbar of TrendWorX32 Configurator, shown in the figure below, contains the following command buttons. For more information about these commands, see the **Menus** section.



New Configuration: Inserts a new configuration at the Master Configuration level.

New Database Group: Inserts a new database group at the Configuration level.

New Logging Group: Inserts a new logging group the Database Group level.

Insert New Opc Tags: Inserts a new OPC tag at the Group level.

New Simulation Variable: Inserts a new simulation variable at the Group level.

New Expression: Inserts a new expression at the Group level.

Multiply: Multiplies the selected item in the tree control.

Delete: Deletes the selected item from the tree control.

Menus

The TrendWorX32 Configurator menu bar contains the following menus:

- **File menu**
- **Edit menu**
- **View menu**
- **Go menu**
- **Action menu**
- **Tools menu**
- **Help menu**

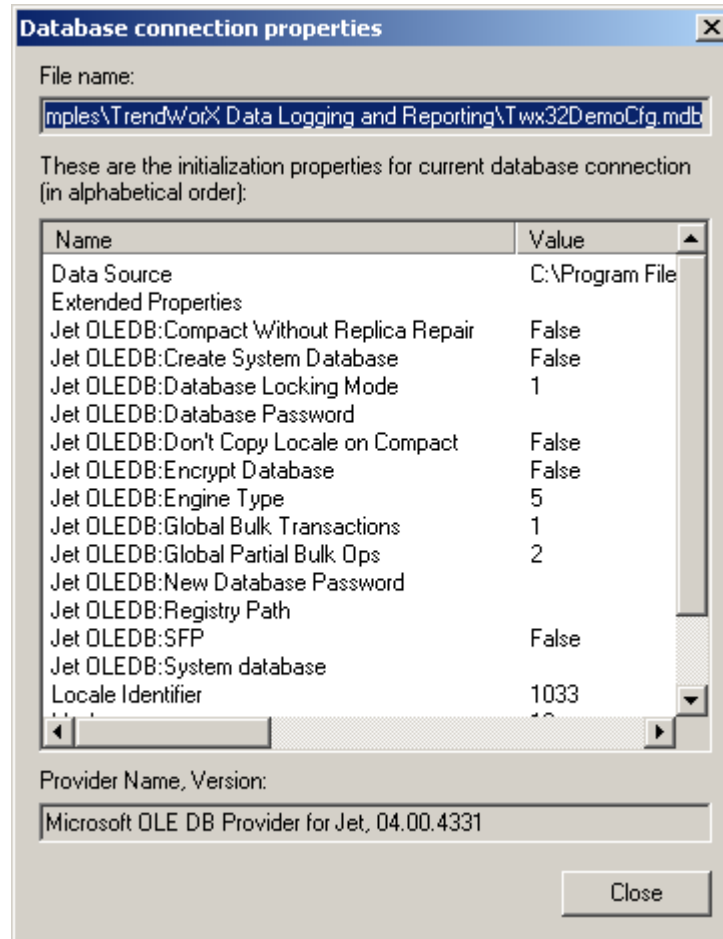
File Menu

The **File** menu of the TrendWorX32 Configurator contains the following commands:

Command	Shortcut Key	Function
New	CTRL+N	Creates a new configuration database.
Open	CTRL+O	Opens a new .mdb (Microsoft Data Access) or .udl (Microsoft Data Link) file.
Save As		Saves the database under a different name.
Connection Properties		Opens the Database Connection Properties dialog box.
Export		Exports data from a selected .csv file.
Import		Imports data from a selected .csv file.
XML Export		Exports configuration data to an XML file.
XML Export Schema		Exports configuration data to an XML Schema file.
XML Import		Imports configuration data from an XML file.
XML Validate		This feature does not import an XML data file, but it will try to validate its structure using stored XML schema. Once it passes this validation, the XML file is acceptable for import by the Configurator.
Make Active		Downloads a configuration to the server before data logging.
Exit		Closes the applications and stops data logging if it started within the Configurator.

Database Connection Properties

Selecting **Connection Properties** from the **File** menu opens the **Database Connection Properties** dialog box, shown below, which lists the initialization properties for the current database connection.

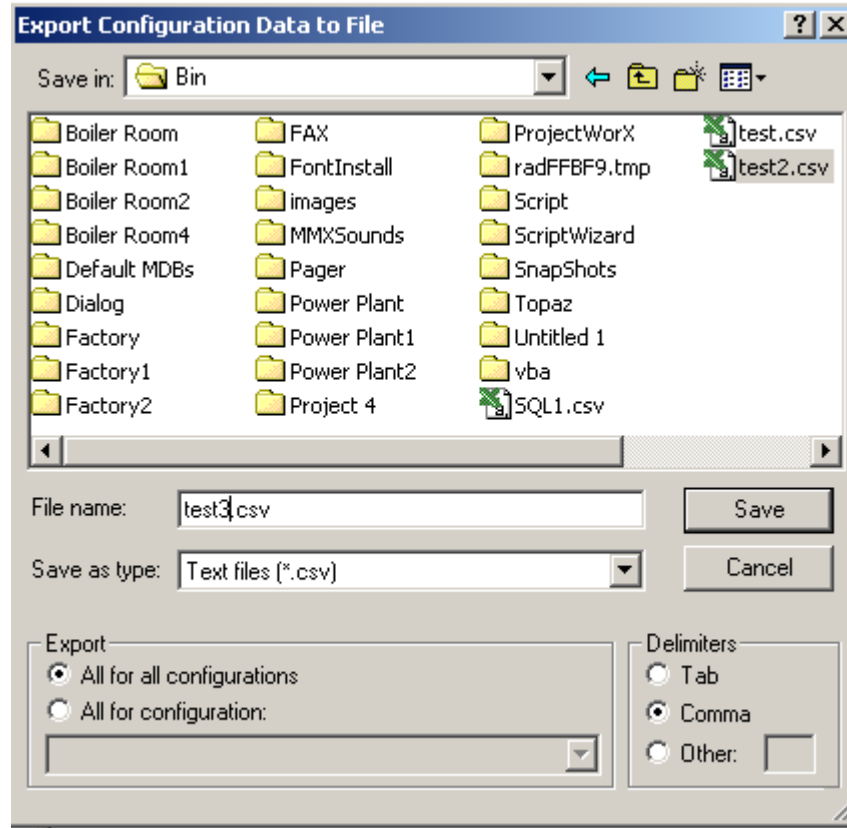


Database Connection Properties Dialog Box

Exporting Configuration Data

Exporting Data to a Text or CSV File

The Configurator offers the flexibility of exporting data from your configuration database to a text (.txt) file or a Microsoft Excel (.csv) file. To export data, select **Export** from the **File** menu. This opens the **Export Configuration Data to File** dialog box, as shown in the figure below. You can then specify the delimiters for exporting the data. Unless you specify delimiters in the **Export Configuration Data to File** dialog box, the file uses **Commas** as delimiters by default. Each group contains headings and columns that provide information about each item, such as descriptions and associated translations and expressions. It also provides the "tree" pathway for each item. Choose the directory to which you want to export the data from your database. In the **Save As Type** field, choose the file type (.txt or .csv) that you would like to save.



Exporting Configuration Data

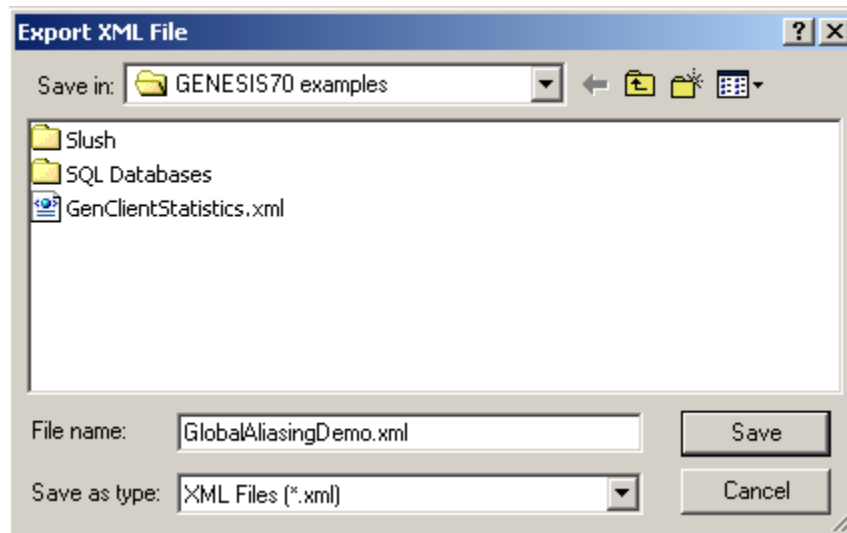
Exporting Data to an XML File

The Configurator also allows you to export data from your configuration database to an XML file. The XML export/import functionality was mainly developed for Windows platforms that do not support databases (e.g. Windows CE and Windows Embedded). XML has the following advantages over the CSV import/export function:

- XML has a standardized format, unlike the text/CSV format, which uses various delimiters (e.g. TAB instead of commas, strings could not accept all characters, etc.)
- XML is language-independent, whereas CSV converts date/time, floats, and currency fields according to local settings in Windows. For example, using CSV, you cannot export data on German Windows and import it on English windows without making changes
- Windows has an installed automation object that has the capability to work with XML. Thus, programmers can create/modify their configurations outside the Configurator using Visual Basic, if desired.
- XML supports schemas. A **schema** is a special XML file that specifies the data structure of an XML data file.

To export data, select **XML Export** from the **File** menu. This opens the **Export XML File** dialog box, as shown in the figure below. Give the file a name, and then choose the directory to which you want to export the data from your database. Click **Save**.

Note: You can also export configuration data to an XML Scheme file by selecting **XML Export** from the **File** menu.



Exporting Configuration Data to an XML File

Importing Configuration Data

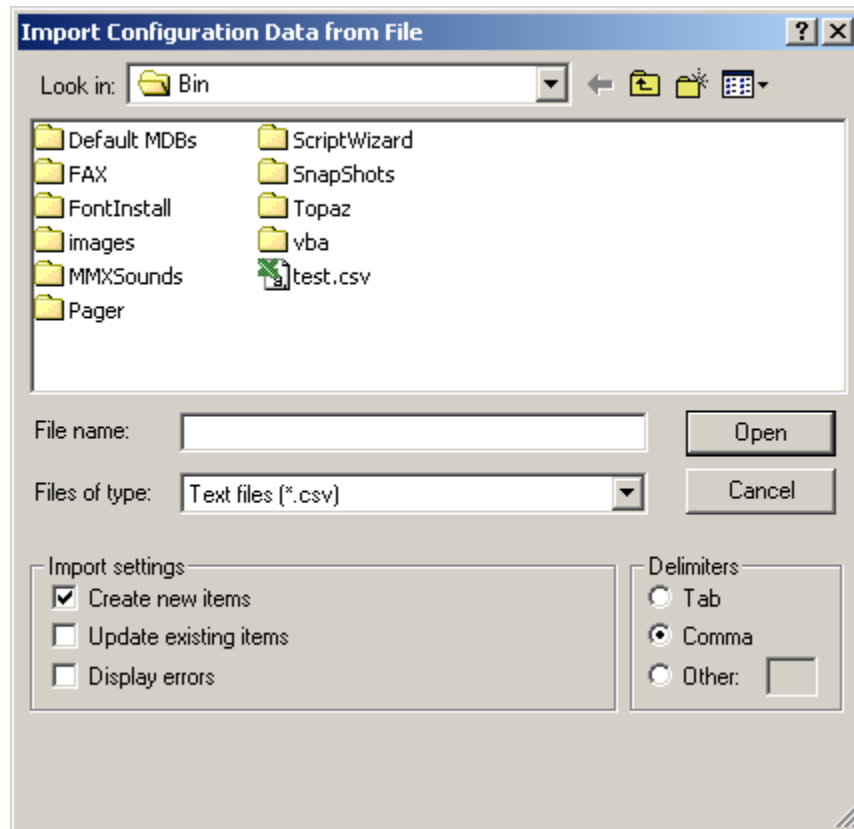
Importing Data From a Text or CSV File

The Configurator offers the flexibility of importing data from a text (.txt) file or a Microsoft Excel (.csv) file to your configuration database. To import data, select **Import CSV** from the **File** menu. This opens the **Import Configuration Data From File** dialog box, shown below. You can then specify the delimiters and choose from the following import settings:

- **Create new items.** When the import file contains items that are not yet in the configuration database, then it creates them. Otherwise it skips these items.
- **Update existing items.** When the import file contains items that are in the configuration database, then it updates them using data from the import file. Otherwise it skips these items.

Note: Either **Create new items** or **Update existing items** must be selected. Otherwise there is nothing to import.

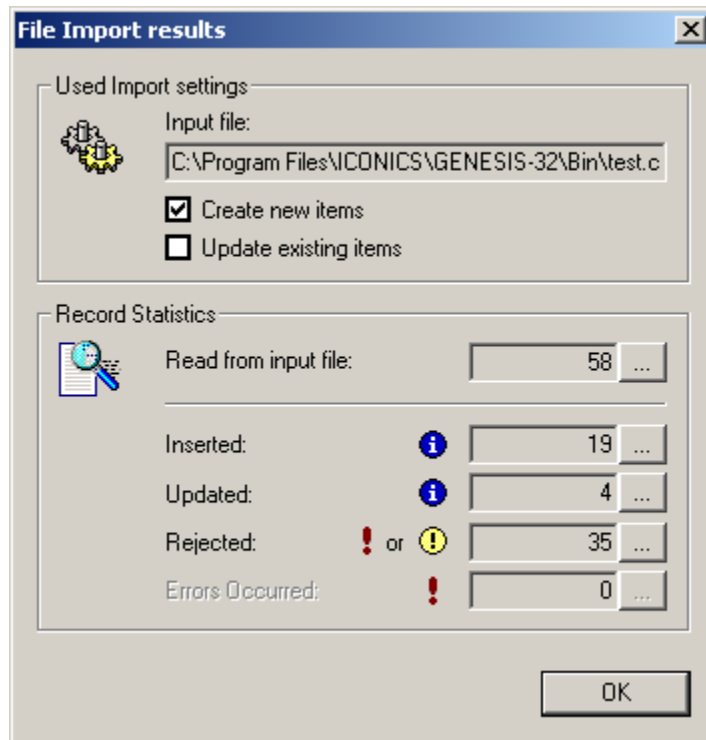
- **Display errors.** When this item is checked, the Configurator shows a dialog box if an error occurs, and then asks you if you want to proceed with the import. When it is not checked, it skips all items where an error occurred.



Importing Configuration Data

When you have selected a file to import, click **Open**. When the import is completed, the **File Import Results** dialog box opens, as shown below. This shows the import settings, including the input file name. It also provides a summary of the import, including how many items were inserted, updated, or rejected, and shows how many errors occurred.

Click the ... button to the right of each field to get the details view of the import results, as shown below. This view shows the specific items that were inserted, updated, or rejected, as well as a description of any errors that occurred.



File Import Results Dialog Box

Importing Data From an XML File

The Configurator allows you to import data from your configuration database to an XML file. The XML export/import functionality was mainly developed for Windows platforms that do not support databases (e.g. Windows CE and Windows Embedded). XML has the following advantages over the CSV import/export function:

- XML has a standardized format, unlike the text/CSV format, which uses various delimiters (e.g. TAB instead of commas, strings could not accept all characters, etc.)
- XML is language-independent, whereas CSV converts date/time, floats, and currency fields according to local settings in Windows. For example, using CSV, you cannot export data on German Windows and import it on English windows without making changes
- Windows has an installed automation object that has the capability to work with XML. Thus, programmers can create/modify their configurations outside the Configurator using Visual Basic, if desired.
- XML supports schemas. A **schema** is a special XML file that specifies the data structure of an XML data file.

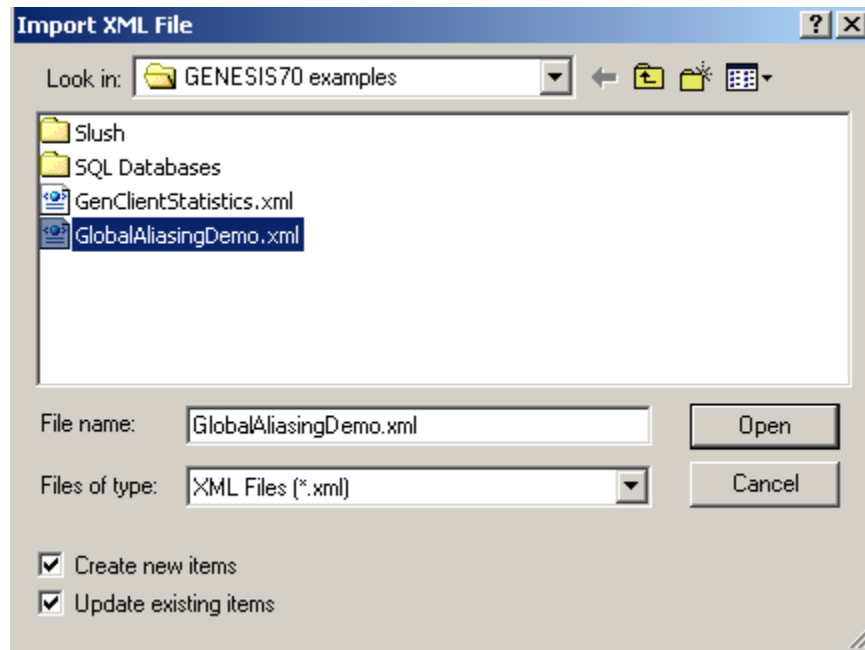
To import data, select **XML Import** from the **File** menu. This opens the **Import XML File** dialog box, as shown in the figure below. Give the file a name, and then choose the directory from which you want to import the data. You can then specify the delimiters and choose from the following import settings. Click **Open**.

- **Create new items.** When the import file contains items that are not yet in the configuration database, then it creates them. Otherwise it skips these items.

- **Update existing items.** When the import file contains items that are in the configuration database, then it updates them using data from the import file. Otherwise it skips these items.

Note: Either **Create new items** or **Update existing items** must be selected. Otherwise there is nothing to import.

Note: Selecting **XML Validate** from the **File** menu does not import an XML data file, but it will try to validate its structure using stored XML schema. Once it passes this validation, the XML file is acceptable for import by the Configurator.



Importing Configuration Data From an XML File

Activating the Database

Once your configuration is complete, you need to make sure that it is the active database. The database that is currently active is the one that the alarm server will use. To make the current database active, select **Make Active** from the **File** menu. If the **Make Active** selection is grayed out, then the current database is already the active database.

A dialog box appears showing both the current active database and database that is currently being edited, as shown in the figure below. To set the edited database as the active database, click the **Yes** button.

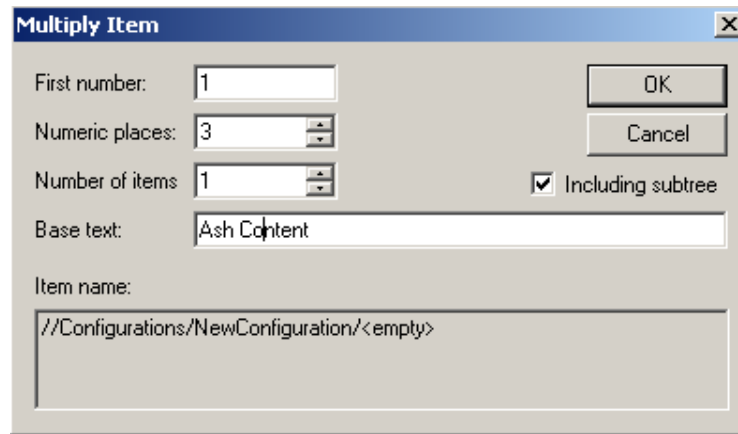
Edit Menu

The **Edit** menu contains the following commands, which enable you to change the Configurator interface:

Command	Shortcut Key	Function
New - Configuration	CTRL+T	When you select the Master Configuration level, this command inserts a new configuration.
New - Database Group	CTRL+D	When you select the Configuration level, this command inserts a new database group.
New - Logging Group	CTRL+G	When you select the Database Group level, this command inserts a new logging group.
New - OPC Tag, Expression, or Simulated Variable	CTRL+W CTRL+E	When you select the Group level, this command inserts a new tag attached to an OPC tag, an expression, or a simulated variable.
Rename	CTRL+R	Renames the selected object.
Multiply	CTRL+M	Multiplies the selected object in the tree control. (For more information on this command, see the section below.)
Delete	DEL, CTRL+DEL	Deletes the selected object.
Cut	CTRL+X	Cuts the selected object from the current view and places it on the clipboard.
Copy	CTRL+C	Copies the selected object to the clipboard.
Paste	CTRL+V	Pastes the last object placed on the clipboard.
Select All	CTRL+A	Selects all objects in a list. The selection is shown in the upper-right-hand section of the Viewer.
Invert Selection		Unselects all selected items and selects all unselected items in a list in the upper-right-hand section of the viewer.

Multiply Item Command

To multiply an item, select the item and then choose **Multiply** from the **Edit** menu. This opens the **Multiply Item** dialog box, shown below.



Multiply Item Dialog Box

The following fields are available in the **Multiply Item** dialog box.

First number. Refers to the number that will be attached to the first multiplied item.

Numeric places. Refers to how many digits should be attached to the end of the initial item name.

Number of items. Determines how many items will be added to the current configuration.

Base text. Sets the initial item name for all multiplied items.

The dialog box shown above would produce the following tag: 'Ash Content001.'

If you want to multiply all subfolders as well, check the Including **Subtree** check box.

Note: It is possible to move (drag-and-drop), or copy groups and tags from one area to another. It is also possible to move or copy tags from one group to another. In addition, it is possible to move or copy areas from one configuration to another.

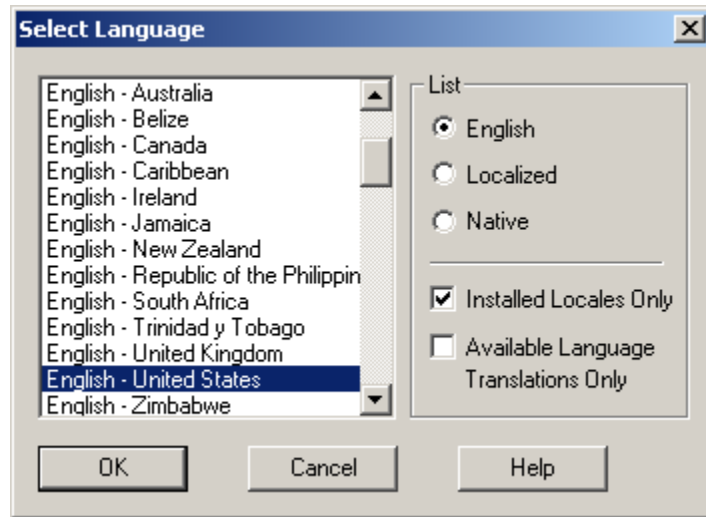
View Menu

The **View** menu contains the following commands:

Command	Shortcut Key	Function
Toolbars - Standard Buttons		Displays the Main toolbar.
Toolbars - Data Manipulation Buttons		Displays the Configuration toolbar.
Status Bar		Toggles the status bar, which indicates the status of the Configurator, which mode you are in (configuration or runtime), and the date and time. When navigating through the menu items, whichever item the mouse is over will be displayed in the status bar. Also indicates any actions that are being performed by the server.
Note: It is possible to select only one of these display options (Large Icons, Small Icons, List, or Details).	Large Icons	F7 Displays items as large icons.
	Small Icons	F8 Displays items as small icons.
	List	F9 Displays items in a list.
	Details	F10 Displays the items in a list along with detailed information about the configuration of each item.
	Dialog View	F11 Toggles the configuration window.
	Sort By	Displays a list of options for sorting the view. The options listed depend on the level within the view.
	Show/Hide Columns	Displays a list of options that you can choose to show or hide in the view. The options listed depend on the level within the view and are identical to those in the Sort By submenu.
	Select Language	Specifies the language to be used in the Configurator from the Select Language dialog box. Select the language you wish to use for your system and click OK . For navigation purposes, use the radio buttons and check boxes in the List section.
	Global Refresh	F5 Refreshes the data for the entire Configurator screen.
	Subtree Refresh	CTRL+F5 Refreshes only the data contained in the currently selected subtree.

Selecting Languages

The **Select Language** function on the **View** menu allows you to choose which language to use in your display. Choosing **Select Language** from the **View** menu opens the **Select Language** dialog box, shown in the figure below.



Select Language Dialog Box

Define the parameters listed in the table below. Then click **OK** to return to the work area.

Select Language Parameters

Parameter	Description
List	Lists available languages. Depending on which item you have selected, the view on the left will change. If English is checked, the languages will appear as their English name. If Localized is checked, the languages will appear with the native country in parentheses (for languages with several dialects only). When Native is checked, the languages are displayed the way they would be written in that language.
Installed Locales Only	If this is checked, local languages appear in the box.
Available Language Translations Only	Checking this box allows you to choose from available language translations only.

Go Menu

The **Go** menu contains the following commands, which serve as navigation aides:

Command	Shortcut Key	Function
Back	CTRL+ALT+Left Arrow	Displays the previous screen.
Forward	CTRL+ALT+Right Arrow	Displays the next screen.
Up One Level		Moves the cursor up one level.
Next Item	ALT+Down Arrow	Moves the cursor to the next item.
Previous Item	ALT+Up Arrow	Moves the cursor back to the last item selected.
Expand Item	ALT+Left Arrow	Expands an item that contains a submenu.
Collapse Item	ALT+Right Arrow	Collapses an item that contains a submenu.
Page Up	ALT+PgUp	Moves the cursor up to the first item in the tree.
Page Down	ALT+PgDown	Moves the cursor down to the last visible item in the tree.
Home	ALT+Home	Moves the cursor up to the first item in the tree.
End	ALT+End	Moves the cursor down to the last visible item in the tree.
Next Pane	F6	Moves the cursor to the next pane.
Previous Pane	SHIFT+F6	Moves the cursor to the last pane used.

Action Menu

The **Action** menu contains the following commands:

Command	Function
Start logger	Starts data logging for the active configuration.
Stop logger	Stops data logging for the active configuration.

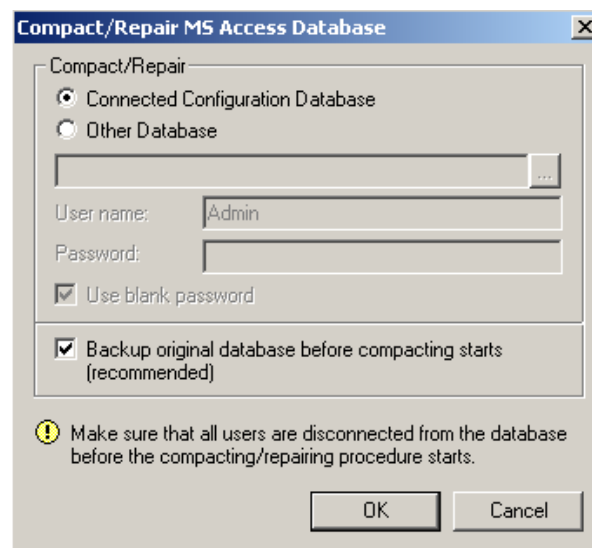
Tools Menu

The **Tools** menu contains the following options.

Command	Function
Set Working Directory	Sets a working directory for all files relating to the saved configuration.
Options	Launches a dialog that gives you several options for controlling the inserting and updating of tags, applying changes, and automatically connecting to and disconnecting from the server as well as automatically updating data.
Unload Tag Browser	Refreshes the OPC Universal Tag Browser .
Compact/Repair MS Access Database	Opens the Compact/Repair MS Access Database dialog box, which is described below in detail.
MSDE Manager	Launches the ICONICS MSDE Manager for configuring MSDE 7.0 and MSDE 2000 databases.

Compacting and Repairing Microsoft Access Databases

You can compact Microsoft Access databases, which can be either TrendWorX32 configuration databases or historical databases, using the **Compact/Repair MS Access Database** dialog box, shown below. Microsoft Access-based databases are subject to database fragmentation over time, and the support for the database will compact the target database, reclaim unused space, and drastically improve database performance.



Compact/Repair Microsoft Access Database

It is critical that no users or client applications (including TrendWorX32 SQL

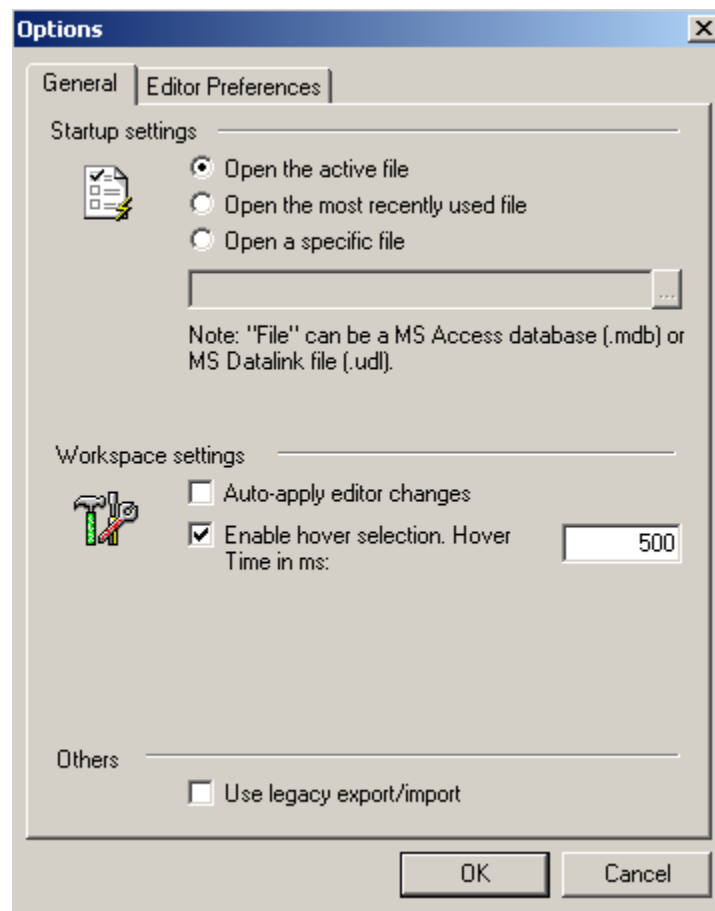
Server) are connected to the database at the time of compacting and that, if the **Backup Original Database** option is selected, there is plenty of available hard disk space.

Options

Selecting **Options** from the **Tools** menu opens the **Options** dialog box, as shown in the figure below.

General Tab

The **General** tab of the **Options** dialog box, shown in the figure below, sets the startup and workspace parameters for the Configurator.



Options Dialog Box: General Tab

Startup Settings

The **Startup Settings** options allow you to save regional settings in the registry so that they are applied each time you start the Configurator. This applies to the language settings as well as time and date settings. Select one of the following startup settings:

- **Open the active file:** Launches the currently active database upon startup.
- **Open the most recently used file:** Launches the recently opened database.
- **Open a specific file:** Specifies a Microsoft Access (.mdb) or Microsoft Datalink (.udl) database to launch upon startup. To select a database, click the ... button next to the text box and browse for the file. When this option is selected, the "active" database is overridden by the specified database.

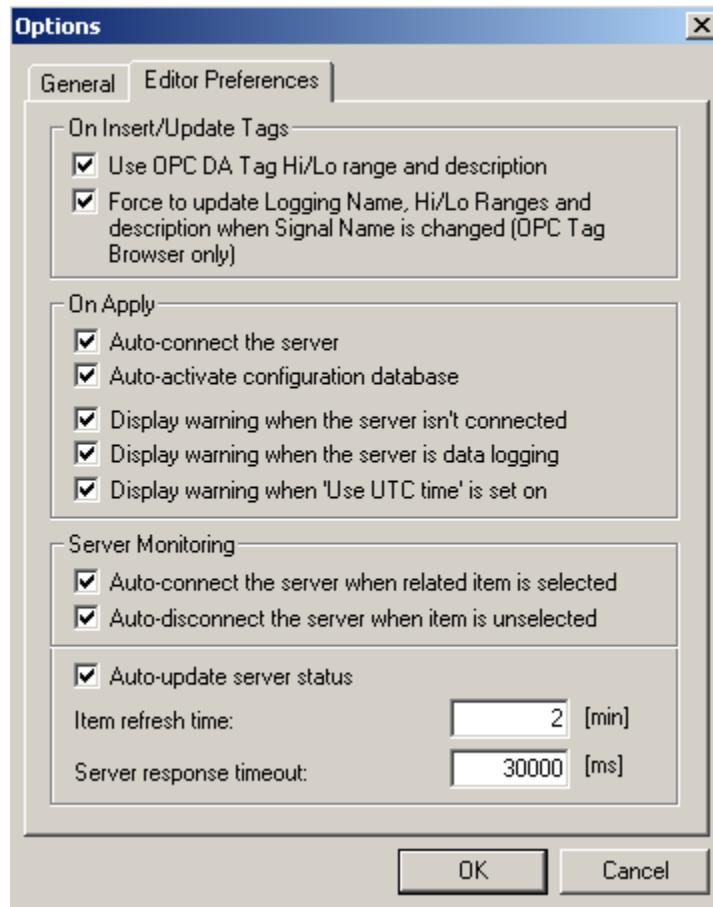
Workspace Settings

The following **Workspace Settings** are available:

- **Auto-apply editor changes:** Checking this option allows changes to the configuration database to be saved each time you switch dialogs without clicking on the **Apply** button or being shown a message asking if you would like to apply changes.
- **Enable hover selection:** Checking this option allows you to highlight an item by moving the mouse pointer over that item and keeping it there for a specified amount of time (in milliseconds).

Editor Preferences Tab

The **Editor Preferences** tab of the **Options** dialog box, shown in the figure below, gives you several options for controlling the inserting and updating of tags, applying changes to your configurations, and automatically connecting to and disconnecting from the server as well as automatically updating data.



Options Dialog Box: Editor Preferences Tab

Help Menu

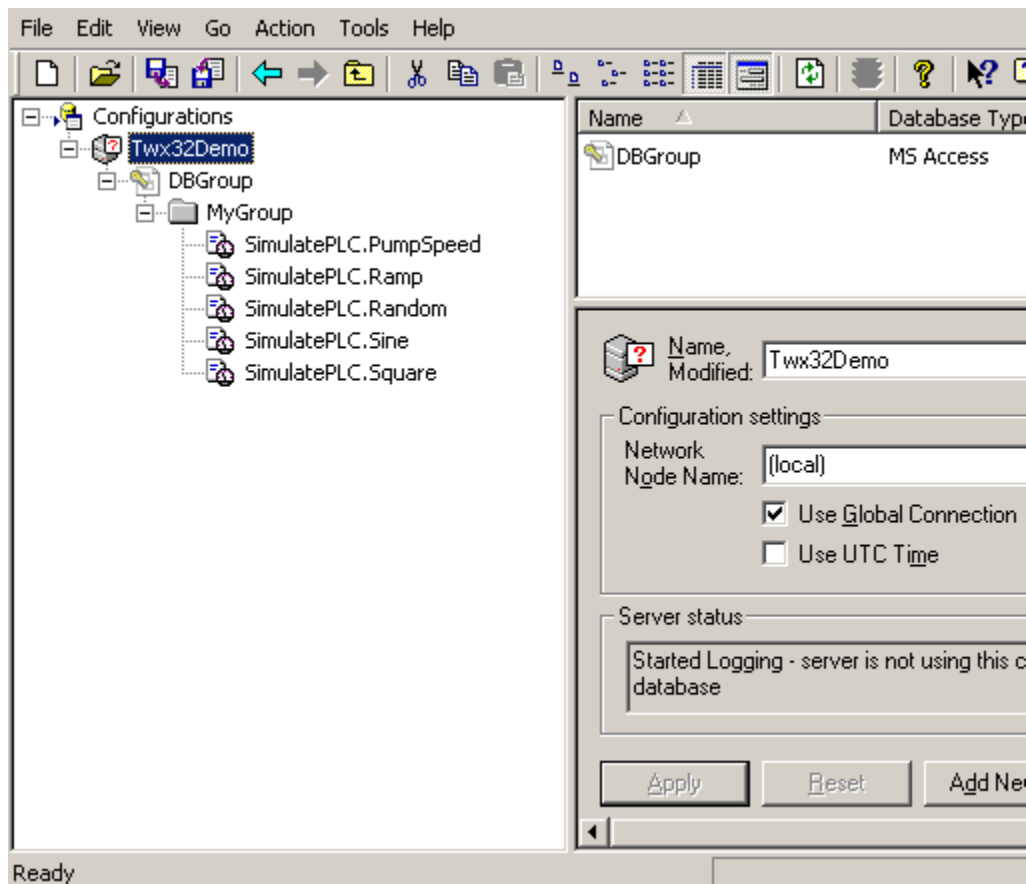
The **Help** menu contains the following commands:

Command	Shortcut Key	Function
Help Topics	F1	Launches the online help for the TrendWorX32 Configurator.
What's This?	SHIFT+F1	Displays context-sensitive help topics.
About Application		Launches the ICONICS About Box , which contains information about the product version number, copyright, and available disk space. It also contains information about how to contact ICONICS.

TrendWorX32 Configurator Setup

The TrendWorX32 Configurator setup “tree” in the left-hand pane of the Configurator screen, shown in the figure below, contains the following levels of configuration, from lowest to highest:

- Tags
- Logging group
- Database group
- Configuration



TrendWorX32 Configuration Tree

The extent of configuration varies from level to level. Starting from the highest level in the tree, the extent to which you can manipulate the settings changes depending on the current selection.

Tags. At the tags level, the lowest level, you can click on a tag to view information about the tag and to manipulate its settings. In addition, you can add new tags by clicking **Add New** at the bottom of the tags display.

Logging group. The logging group level allows more flexibility. At this level, you can configure data-collection, logging, and table-management settings, as shown in the figure above. You can also add new tags at this level.

Database group. At the database group level, you can actually establish database-connection settings. You can activate or deactivate the data-logging process. You can also switch logging databases.

Configuration. At the configuration level, which is just below the configuration file level, you can connect or disconnect to the logger by clicking the **Connect/Disconnect** buttons in the right-hand pane of the configuration setup. You can also start or stop data logging by clicking the **Start Data Logging/Stop Data Logging** buttons. It is important to download the configuration before you start data logging. You can do this by clicking the **Make Active** button.

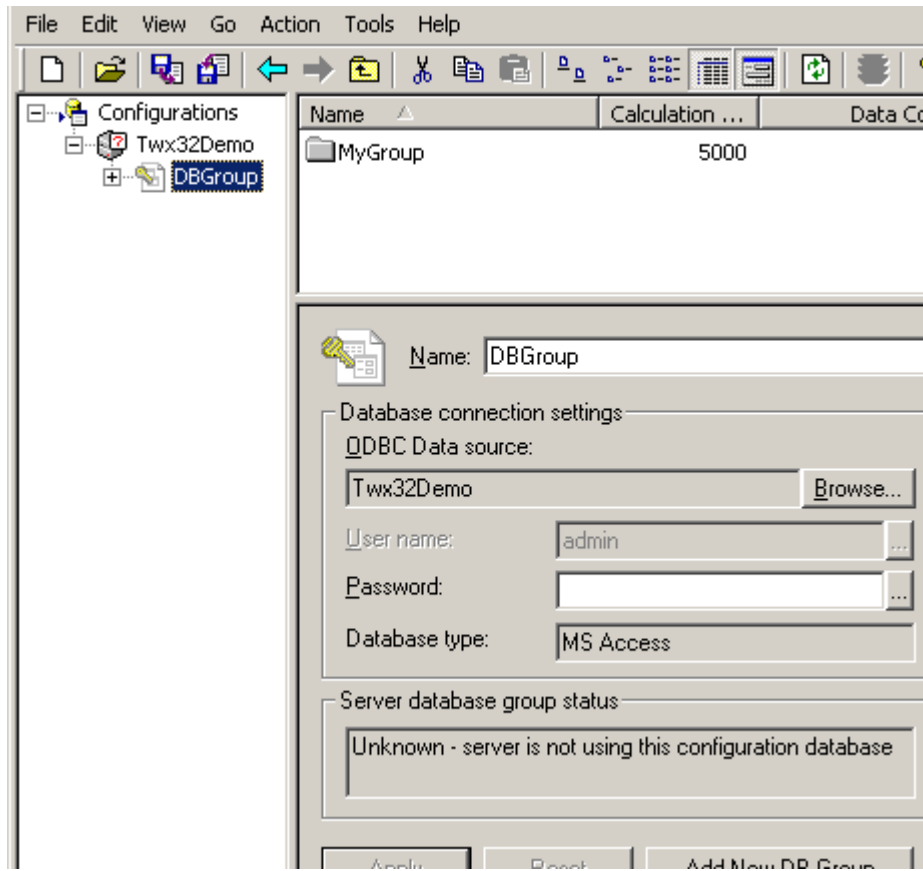
Note: At each level, you can add an item from the level below by using the right-click menu.

Database Groups

From a configuration point of view, a database group represents a:

- High-level grouping of data-logging groups.
- Multithreaded object for managing data updates and logging to disk activities, along with an extensive runtime user interface.
- Physical connection to an underlying database.

In addition, each database maintains a list of recent errors for troubleshooting, which you can view by selecting a database object and selecting **Error Log View** from the **View** menu.



Database Group Configuration

As shown in the figure above, multiple database objects can exist within the same instance of the TrendWorX32 Configurator, and each of them can be physically connected to the same or different database media. The TrendWorX32 Configurator resolves any conflicts that might occur between databases, such as table names.

Each **database object** is responsible for managing groups of signals. A database group object allows for:

- A logical collection of signals to be data-logged.
- Common data-collection rate and data-logging table.
- Common data-logging configuration.
- Group style management and editing capability for a collection of signals.

A database group is used to group OPC tags. Clients can use this information for filtering purposes. A tag can exist under multiple database groups or even multiple times within the same logging group. In the latter case, the logging name of the tag must be different.

Tags

A **tag** represents a single object for OPC information. A tag can contain information for multiple types of OPC input and output.

Note: For historical replay, each historical tag is identified by:

DatabaseObjectName.GroupObjectName.LoggingName

Modifying any of these elements requires re-establishing client connections.

Configuring a New File

New Configuration

Creating a New Database Group

Creating a New Data Source

Selecting a Logging Database

Creating a New Logging Group

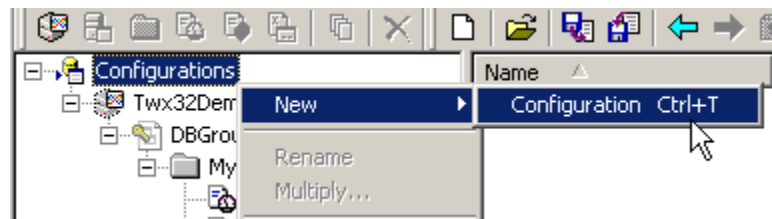
Control Board for Groups

Creating a New Tag

Creating a New Configuration

To start a new configuration:

1. Select **New** from the **File** menu of the TrendWorX32 Configurator. This displays window with a new **Configurations** folder displayed in the left-hand pane of the split window.
2. Right-click the **Configurations** folder and select **New > Configuration** from the pop-up menu (or press the shortcut keys **CTRL+T**).



Creating a New Configuration

3. Enter the configuration settings in the **Configuration** dialog box displayed in the right-hand pane of the window, as shown below.
4. Click **Apply**. The name of the new configuration will be displayed in the left-hand pane of the window under **Configurations**.

Configuration Dialog Box

You can configure the following settings using the **Configuration** dialog box.

Name. Enter the name of the new configuration in the **Name** field.

Node name. Enter the name of the PC through which the TrendWorX32 SQL Server will be accessed. It is "local" by default.

Note: Once all configuration work here is completed, you should download the configuration to the TrendWorX32 SQL Data Logger by clicking **Make Active** to ensure that the Data Logger has processed all changes.

Network node name. The **Network Node Name** is the name of the network where the TrendWorX32 SQL Server will be accessed. It can be the local name, if the TrendWorX32 SQL Server is running locally, or a remote node name. Clicking **Nodes** displays a list of all available network nodes.

In addition to the above, the following functions are available within the configuration dialog box.

Start data logging. Clicking **Start Data Logging** starts the data-logging mode. This will not be activated if there are any errors that prevent proper logging of data (i.e. table naming conflicts, etc.).

Within this mode you can:

- Retrieve up-to-date information with respect to database generated errors.
- Retrieve up-to-date information with respect to database tables currently being logged.
- Retrieve up-to-date information with respect to the time it takes to log data.
- Deactivate a database object for maintenance, and then reactivate it.

Stop data logging. Clicking **Stop Data Logging** stops the data-logging mode.

Connect. Clicking **Connect** establishes a physical connection to the TrendWorX32 Data Logger. Once the connection has been established, you can make a configuration active, start or stop data-logging, and reset the Data Logger's configuration (i.e. erase *all* configured groups and tags from memory).

Disconnect. Clicking **Disconnect** disconnects the Data Logger. No interaction with the Data Logger will be available until the connection is re-established.

Make active. Clicking **Make Active** downloads the selected configuration to the Data Logger. The Data Logger will create a historical database "footprint" into the target databases, which can be used to configure the TrendWorX32 Reporting tool.

Add new configuration. Clicking **Add New Configuration** creates a new data-logging configuration and automatically selects it as the current node in the configuration tree.

Use UTC time. If **Use UTC Time** is checked, all time stamps stored in the database will be stored as UTC time stamps. This is to accommodate automatic daylight savings time switching in Windows when the Data Logger is logging data. All historical clients and TrendWorX32 Reporting tools will always retrieve historical data in their local (non-UTC) time.

Note: TrendWorX32 up to and including Version 6.1x is using the Windows-based APIs for converting a time from local time to UTC or from UTC to local time. The Windows APIs do not correctly adjust the conversion for the daylight savings time if the timestamp to be converted was obtained from a different time period (i.e. it was obtained in "summer" time but now we have "winter" time). TrendWorX32 Version 7.0 has new time conversion utilities that account for this discrepancy. There are, however, some things to consider:

- These functions are used by default (no user enabling is required).
- This is what they do in order to convert each timestamp:
 - o They check Windows for the PC Time Zone Settings and to see if automatic daylight savings is enabled.
 - o They also obtain from Windows the times/dates for switching over. (These dates do not change; they are in the form of, e.g., the first Sunday of April.)
 - o Depending on the previous information, the new functions properly adjust the conversion times to compensate for daylight savings time.

Use global connection. This option instructs the TrendWorX32 SQL Server to maintain an open database connection, for each database group, for the duration of the data-logging activity. By default, it is set to TRUE. It should be used when the data-logging application writes frequently to the database; it yields a better performance. However, if data-collection rates are slower and logging to disk is configured to be slow, disabling this option may actually improve performance, memory utilization, and CPU and database server resource usage.

Advanced/Simple. Clicking the **Advanced/Simple** button displays/hides the **Retrials**, **Retrial Delay**, **Max Samples**, and **Max Logging Packets** parameters.

Retrials. Since version 5.00, the TrendWorX32 Data Logger has supported retrials for data logging, if the data-logging operation failed for any reason. As such, the number of retrials indicates the number of times TrendWorX32 SQL Server will try to log data if the operation fails for the specific data-logging package.

Retrial delay (sec). The **Retrial Delay** option controls the elapsed time (in seconds) between successive retrials.

Max samples. This sets the maximum number of samples to be kept in the memory buffers prior to data logging on a per-signal (tag) basis. It is used to avoid cases in which an excessive amount of samples could consume large memory resources.

Max logging packets. The **Max Logging Packets** option is used with the **Retrials** option to handle data-logging failure cases and to provide a more robust system. It sets the maximum number of data-logging packets to keep in memory, in case of data-logging failure, so that the data-logging activity will not utilize all available PC memory. The larger the number of retrials and max logging packets, the more system memory the TrendWorX32 SQL Server will utilize.

Adjust logging parameters. You can adjust the values of data-logging

parameters and then click the **Adjust Log. Params** button to apply the changes. Of all the available parameters, the **Use Global Connection** field cannot be adjusted while the TrendWorX32 SQL Server is in data-logging mode.

Note: Once you have completed all configuration work, it is recommended that you click the **Make Active** button to download the selected configuration to the Data Logger. Once this is done, the Data Logger creates a historical database "footprint" in the target databases, which can be used to configure the TrendWorX32 Reporting tool.

Remote Download

The TrendWorX32 Configurator supports remote download of database group connections. You can now locally configure ODBC DSN connections. When you click the **Make Active** button, the TrendWorX32 Configurator will download the configuration to the remote PC where the TrendWorX32 SQL Server resides. Upon doing so TrendWorX32 SQL Server will perform a test connection using the database connection strings downloaded by the TrendWorX32 Configurator.

If the test fails with Microsoft Access, it will try to create a new .mdb file in the desired directory. If the test succeeds, it will create an ODBC system data source on the fly using the newly created .mdb file.

If the test fails with Microsoft SQL/MSDE, it will replace the workstation ID with the current node name in both OLEDB and ODBC connection strings. If the test succeeds, it will create an ODBC System data source on the fly using the Microsoft SQL/MSDE database.

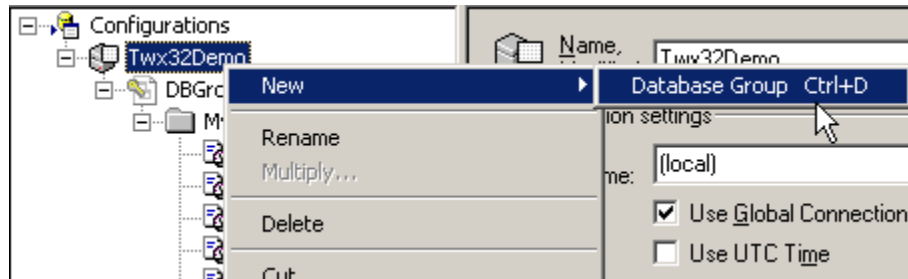
Any errors generated will be reported to the NT event logger and to the Configurator database. The remote data source creation support has also been integrated into the switch database functionality of TrendWorX32 SQL Server to enable "hot-switching" of data-logging databases.

Note: There is no support for this functionality when configuring an Oracle-based data-logging application.

Creating a New Database Group

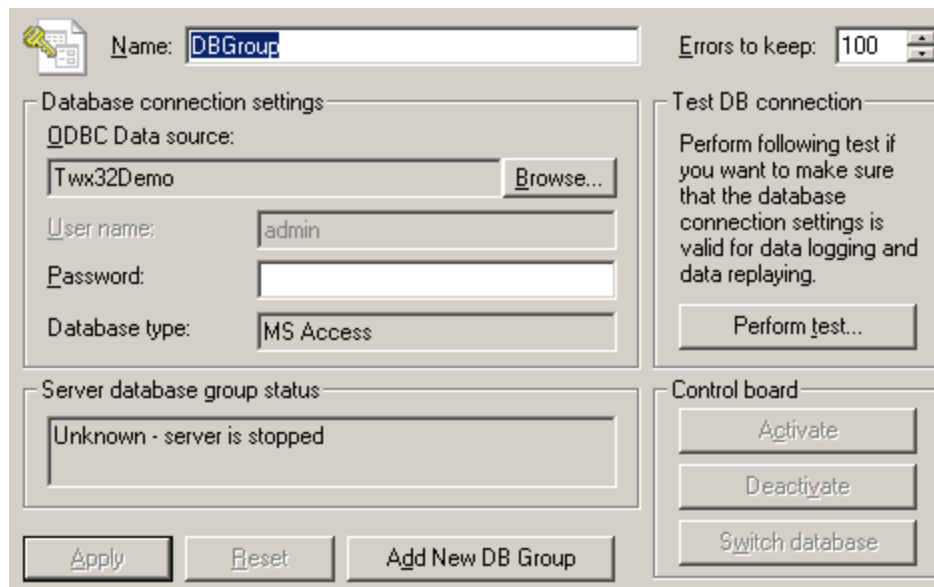
To create a new database group:

1. Right-click on the new configuration and select **New > Database Group** from the pop-up menu, as shown in the figure below.



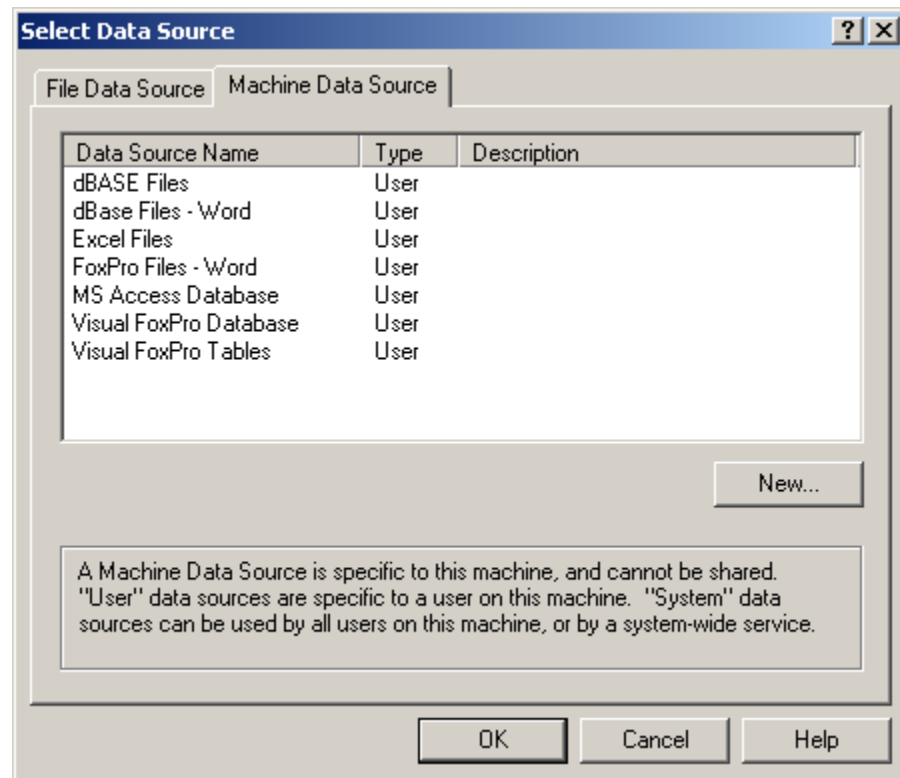
Creating a New Database Group

2. Enter the name of the database group.
3. Enter the database settings in the **New Database Group** dialog box in the right-hand pane of the window, as shown in the figure below.
4. Select a data source by clicking **Browse** in the **Database Connection Settings** field. This opens the **Select Data Source** dialog box, shown below. You have the option of selecting an existing machine data source that is specific to the machine or creating a new machine data source. When you have made your selection, click **OK**.



New Database Group Dialog Box

Note: Currently the TrendWorX32 SQL Data Logger only supports the **Machine Data Source** tab of the **Select Data Source** dialog box. This tab establishes the data source and sets a database connection.



Select Data Source Dialog Box

You can configure the following database group settings using the database group dialog box.

Name. Enter the name of the database group in this field.

Database connection settings. This section allows you to set up a connection to the data source. It also allows you to set up a new data source.

Activate database group. If the TrendWorX32 SQL Data Logger is in runtime mode, clicking **Activate** starts data collection and data logging for all logging groups of the selected database group.

Deactivate database group. If the TrendWorX32 SQL Data Logger is in runtime mode, clicking **Deactivate** stops data collection and data logging for all logging groups of the selected database group.

Database switching. Clicking **Switch Database** allows you to switch to a

different database while in runtime mode.

Note: Database switching is supported in runtime mode; that is, when data logging is active. You need to follow these steps:

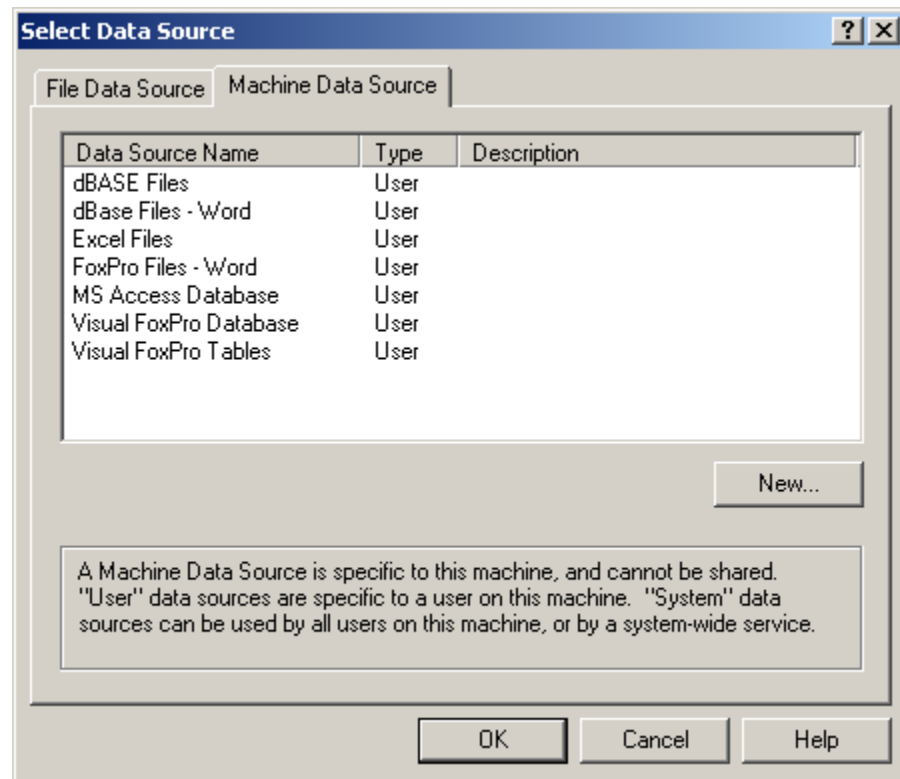
1. Select the database to which you would like to switch by clicking **Browse** in the **Database Connection Settings** field), and then click **Apply**. A warning message will appear indicating that the changes will not take effect until the Data Logger exits data-logging mode and the changes are downloaded to the Data Logger or the **Switch Database** button is clicked.
2. Click the **Switch Database** button to switch the logging database. A message box will warn you again and will give you the choice of whether to redirect pending writes to the new database connection.

When the Data Logger detects a database switch operation, it also may require a higher count of client units if the database switch is an upgrade from a Microsoft Access database to a SQL server database or an Oracle database. If the client units are *not* available, the database switching operation will fail and the active logging database will revert back to the old one. For more information, please review the ICONICS licensing and client units registration documentation.

Creating a New Data Source

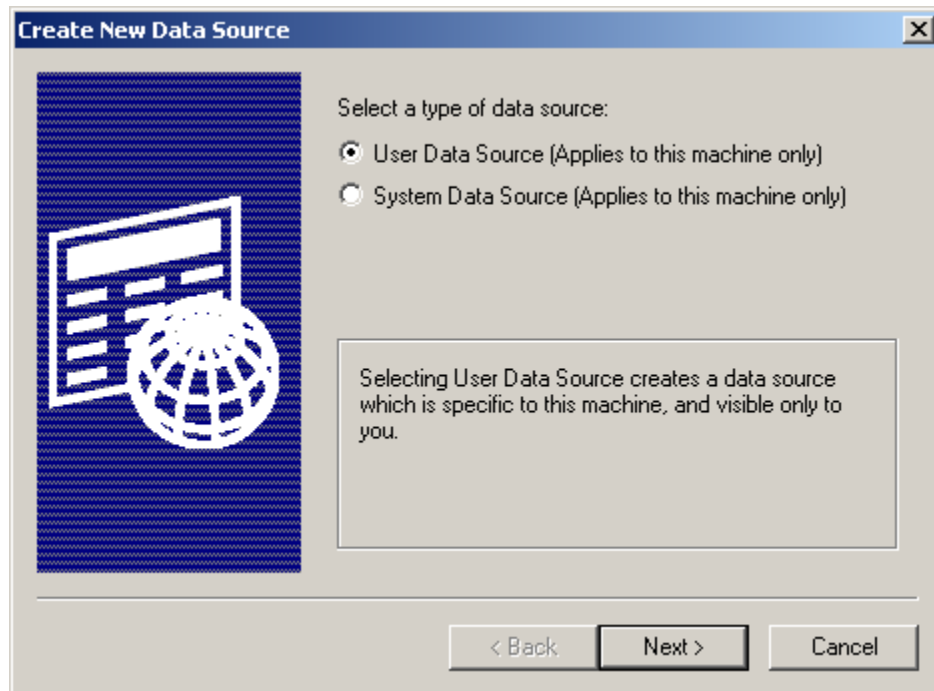
You can also create a new data source and establish a new database connection for the new database group you have just created by using the following procedure:

1. Click the **New** button in the **Select Data Source** dialog box, as shown in the figure below.



Select Data Source Dialog Box

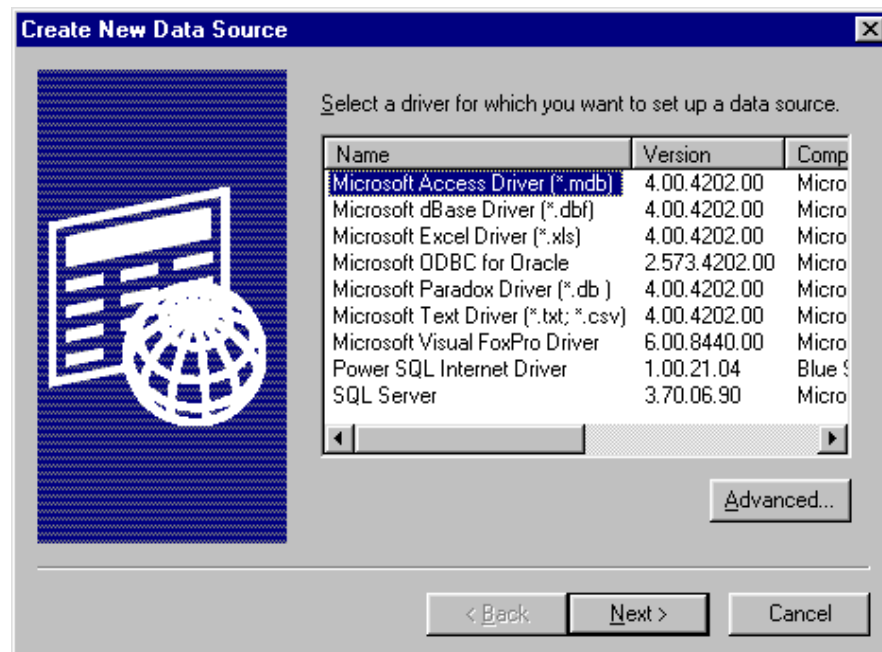
2. This opens the **Create New Data Source** wizard, shown below, which is a series of dialog boxes that will guide you through the required steps to create a new data source. Select a **User Data Source** or a **System Data Source**. We recommend choosing a system data source. Then click **Next** to continue with the data source creation.



Create New Data Source Wizard

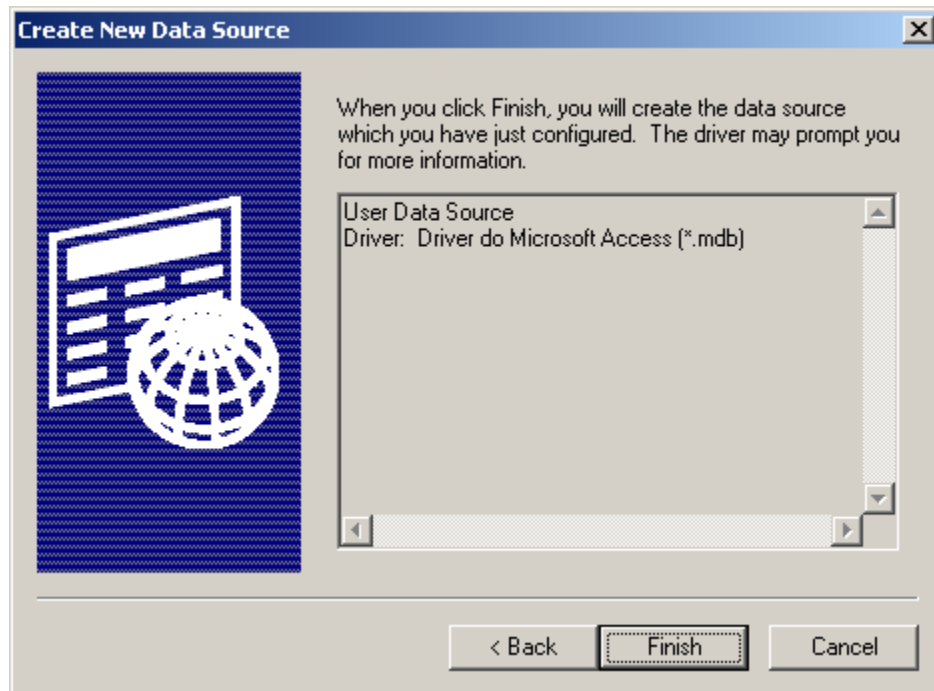
3. Select an installed driver that you wish to use, and then click **Next**.

Note: Currently, the TrendWorX32 SQL Data Logger only supports Microsoft Access, Microsoft SQL Server, MSDE and Oracle databases using the Oracle provided ODBC Driver.



Create New Data Source Wizard

4. In the next dialog box of the **Create New Data Source** wizard, shown below, click **Finish** to create the data source you have just configured.



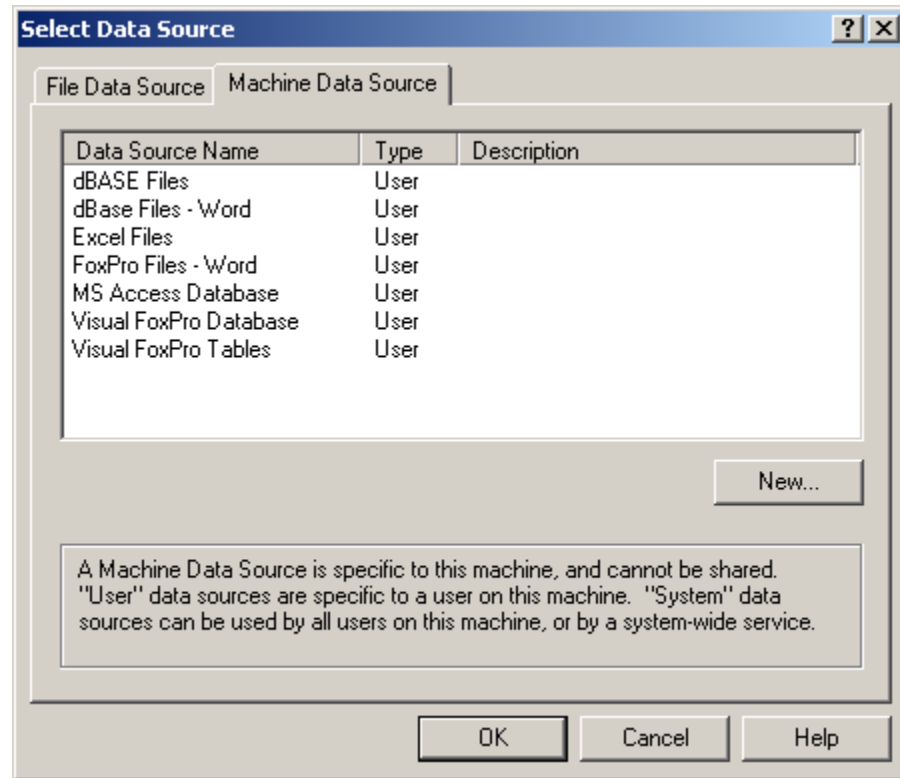
Create New Data Source Wizard

5. The wizard will then provide you with further instructions.

Selecting a Logging Database

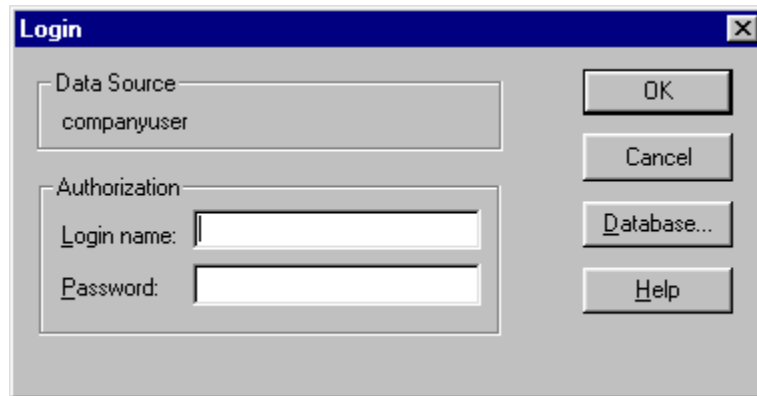
You can now select the data source to which you want to log the data by using the following procedure:

1. Select a logging database by clicking **Browse** in the ODBC Data Source field in the **New Database Group** form.
2. The new data source is then displayed in the **Select Data Source** dialog box, as shown below.



Select Data Source Dialog Box

3. Once you select the proper data source name, click **OK**. You will then be asked to login if you have selected a machine data source, as shown below.



Data Source Login Dialog Box

4. Enter your login name and password.
5. Click the **Perform Test** button in the **New Database Group** form to execute the test for connectivity. You will be notified when the test has been completed, as shown below. Click **OK**.

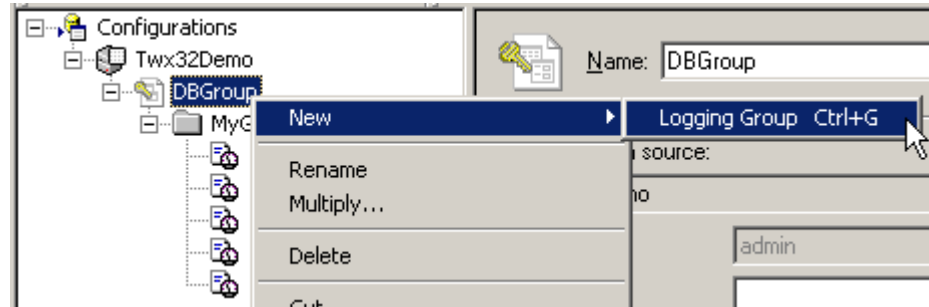


Test Connection

Creating a New Logging Group

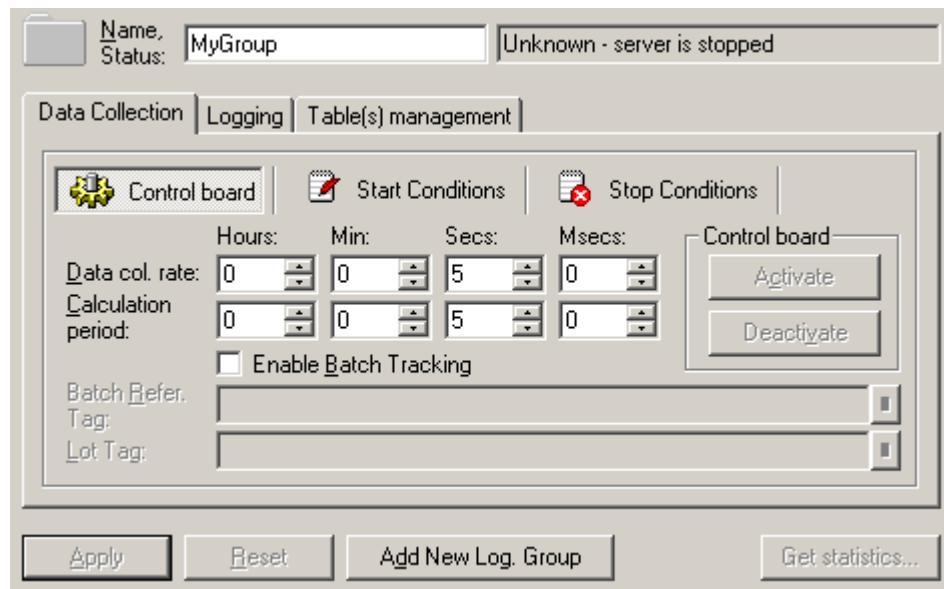
To create a new logging group:

1. Right-click on a database group and select **New > Logging Group** from the pop-up menu, as shown in the figure below.



Creating a New Logging Group

2. This opens the **New Logging Group** dialog box in the right-hand pane of the TrendWorX32 Configurator screen, as shown below.
3. Enter the name of the new logging group in the **Name** field at the top of the dialog box.
4. Define the parameters for the following three tabs:
 - **Data collection tab**
 - **Logging tab**
 - **Table management tab**



New Logging Group Dialog Box

Data Collection Tab

The **Data Collection** tab in the **New Logging Group** dialog box, shown below, allows you to define the **Control Board**, the **Start Conditions**, and the **Stop Conditions** for the new group. Enter the appropriate fields in this tab as defined below.

The screenshot shows the 'Data Collection' tab of the 'New Logging Group' dialog box. At the top, there are fields for 'Name, Status:' with 'MyGroup' entered and a status box showing 'Unknown - server is stopped'. Below this are three tabs: 'Data Collection' (selected), 'Logging', and 'Table(s) management'. The 'Data Collection' tab contains three sub-tabs: 'Control board' (selected), 'Start Conditions', and 'Stop Conditions'. The 'Control board' sub-tab has several controls: 'Data col. rate:' with spinners for Hours (0), Min (0), Secs (5), and Msecs (0); 'Calculation period:' with spinners for Hours (0), Min (0), Secs (5), and Msecs (0); an 'Enable Batch Tracking' checkbox (unchecked); and three text input fields for 'Batch Refer. Tag:' and 'Lot Tag:'. To the right of these fields are 'Activate' and 'Deactivate' buttons. At the bottom of the dialog are 'Apply', 'Reset', 'Add New Log. Group', and 'Get statistics...' buttons.

Data Collection Tab: Control Board

Control Board

Data-collection rate. This field allows you to enter the rate at which data will be collected in units of hours, minutes, seconds, and milliseconds.

Calculation period. This field allows you to define when a new calculation period will begin.

Note: Warnings are built into the system to ensure that the new calculation will not begin at an inappropriate time.

Batch and lot tracking. The TrendWorX32 Configurator supports batch and lot tracking. You can enable this support on a per-data-logging group basis and define OPC string signals that store the current batch and lot information. These values may be automatically retrieved through a bar scanner or manually entered through a graphics screen within a GraphWorX32 or VBA Form.

Start and Stop Conditions

Click **Start Conditions** and **Stop Conditions**, as shown in the figure below, to define the beginning and end of data collection, or the period during which the logging group is connected to the data source and is logging data.

The screenshot shows a software interface for configuring logging conditions. At the top, there's a header with 'Name: MyGroup' and 'Status: Unknown - server is stopped'. Below this is a tabbed interface with 'Data Collection', 'Logging', and 'Table(s) management'. The 'Logging' tab is active, showing a 'Control board' icon and two sub-tabs: 'Start Conditions' (selected) and 'Stop Conditions'. Under 'Start Conditions', there are four checkboxes: 'On Time' (unchecked), 'On Interval' (unchecked), 'On Condition' (unchecked), and 'On Start' (checked). To the right of these are input fields for 'Days' (0), 'Hours' (9), 'Min' (11), and 'Secs' (50). A 'Sync.' checkbox is also present. At the bottom of the dialog are buttons for 'Apply', 'Reset', 'Add New Log. Group', and 'Get statistics...'.

Logging Group Start Conditions

The **Start Conditions** field contains the following options for starting data collection.

On time. When **On Time** is checked, data logging and data collection for the selected group will start at a specified time in hours, minutes, and seconds.

Sync. When **Sync.** is checked, the data collection for the selected logging group will be synchronized to start on the next full time interval starting one full data-collection period from the time selected. For example, if the desired start time is 10:00:00 AM, the data-collection rate is 1 hour, and the Data Logger enters runtime mode at 10:15:00 AM, the data-collection and data-logging activity for the selected logging group will start at 11:00:00 AM.

On interval. When **On Interval** is checked, you can specify the time period (interval) during which you want data logging and data collection to start.

On condition. When **On Condition** is checked, you can define a specific condition for starting data logging. Once you check this box, you can click the **Browse (...)** button on the right. This will display the **Edit Expression** dialog box. Refer to the **Expression Editor** documentation for more information.

On start. Selecting **On Start** starts data collection and data logging for the selected group whenever the Data Logger enters runtime mode (default selection).

Logging Group Stop Conditions

The **Stop Conditions** field contains the following options for stopping data collection.

On time. When **On Time** is checked, data logging and data collection for the selected group will stop at a specified time in hours, minutes, and seconds.

On interval. When **On Interval** is checked, you can specify the time period (interval) during which you want data logging and data collection to stop.

On condition. When **On Condition** is checked, you can define a specific condition for stopping data logging. Once you check this box, you can click the **Browse (...)** button on the right. This displays the **Edit Expression** dialog box. Refer to the **Expression Editor** documentation for more information.

Logging Tab

The **Logging** tab in the **New Logging Group** dialog box, shown below, determines the settings and conditions for the storage of historical information to the database for the selected logging group. It also provides excellent load-balancing capabilities when writing to disk.

Logging Tab

The manner in which the collected data are actually logged to the database by the Data Logger is determined by the settings on the **Logging** tab. The **On Time** check box refers to a data-logging time. **On Interval** refers to a selected time period during which data logging occurs (for example, every 30 minutes). The logging subinterval is used for tags, which have this option enabled. It basically averages samples, at the selected subinterval, prior to logging to disk. If the option for the tag is not enabled, and the tag is not configured to log all values, only one averaged sample will be data-logged.

Note: Currently, the fastest time allowed for logging data to disk is 5 seconds.

Enter the appropriate fields in this section as described below. Click **Apply** to implement the settings.

On time. The **On Time** option enables you to specify the data-logging time in hours, minutes, and seconds.

On interval. When **On Interval** is checked, you can specify the time period (interval) during which you want data logging to occur.

On condition. When **On Condition** is checked, you can define a specific condition for data logging. Once you check this box, you can click the **Browse (...)** button on the right. This displays the **Edit Expression** dialog box. Refer to the **Expression Editor** documentation for more information.

On records. When **On Records** is checked, every time the desired number of samples is collected for any of the tags within the logging group, it will log

the data to the server. Selecting this check box allows you to request data logging on records only.

Table Management Tab

The **Table Management** tab in the **New Logging Group** dialog box, shown below, enables you to configure the data-logging process such that a new table can be created from the data when requested. This allows a better overview of the data than a continuous stream of data would. Enter the appropriate fields in this section as described below. Click **Apply** to implement the settings.

The screenshot shows the 'Table Management' tab of the 'New Logging Group' dialog box. At the top, there is a 'Name' field with 'MyGroup' and a 'Status' field with 'Unknown - server is not using this configurati'. Below this are three tabs: 'Data Collection', 'Logging', and 'Table(s) management', with the latter being selected. The 'Table Name' is 'MyGroup', 'Number of Tables' is '12', and 'Startup Table' is '1'. Under the 'Create New Table' section, there are four options: 'On Time' (unchecked), 'On Interval' (checked), 'On Condition' (unchecked), and 'Any Time Logging Starts' (checked). The 'On Interval' option has sub-fields for Days (0), Hours (1), Min (0), and Secs (0). The 'On Time' option has sub-fields for Days (9), Hours (11), Min (50), and Secs (0). At the bottom, there are four buttons: 'Apply', 'Reset', 'Add New Log. Group', and 'Get statistics...'.

Table Management Tab

Each group of signals stores its data to a single table or a cyclic sequence of tables (user-configurable). This allows for a controlled size of database storage. For example, you can set up the data-logging configuration for a group such that the data are stored to multiple, sequential tables. Trend clients may be configured to retrieve data from the most recent tables, while the other tables are maintained for reporting and comparison with recent data. Although historical information is retrieved by combining information from various historical tables, the ability to store data in multiple (sequential) tables can be used for database maintenance optimization as well as overall system load balancing. By controlling the size of each historical table, you can avoid creating extremely large tables, which may degrade overall data logging and database performance.

To accelerate data retrieval, TrendWorX32 SQL Server creates the necessary database schema to maintain updated information with respect to the time interval for which each table logs data.

The **Table(s) Management** tab configures how the data will be stored in terms of the number of tables and when a new table will be started. The number entered in the **Number of Tables** field determines the maximum number of tables that will be created. Therefore, when that number is reached and the last table is full, the TrendWorX32 SQL Server will wipe out all information in the first table to make room for new data. This is important to remember when configuring the settings in the **Create New Table** field. The reason for limiting the number of tables is to save room in your system.

Table name. Enter the name of the table.

Number of tables. Use the "up" and "down" arrows to specify the number of tables you want created. The maximum number of tables allowed in the **Number of Tables** field is 3000.

Startup table. Use the "up" and "down" arrows to specify the number of tables you want created at startup.

Create new table. This section specifies certain conditions that will determine when a new table should be created.

On time. The **On Time** option enables you to specify a time in hours, minutes, and seconds when you want a new table to be created.

On interval. When **On Interval** is checked, you can specify a time period after which a new table should be created during the data-logging process.

On condition. When **On Condition** is checked, you can define a specific condition upon which the creation of a new table is contingent. Once you check this box, you can click the **Browse (...)** button on the right. This displays the **Edit Expression** dialog box. Refer to the **Expression Editor** documentation for more information.

Any time logging starts. When option is checked, table management will occur the moment logging starts.

Control Board for Groups

The **Control Board** is common to all dialog boxes used for group configuration. The **Control Board** allows you to control the server status as well as activation and deactivation of data logging for the selected logging group.

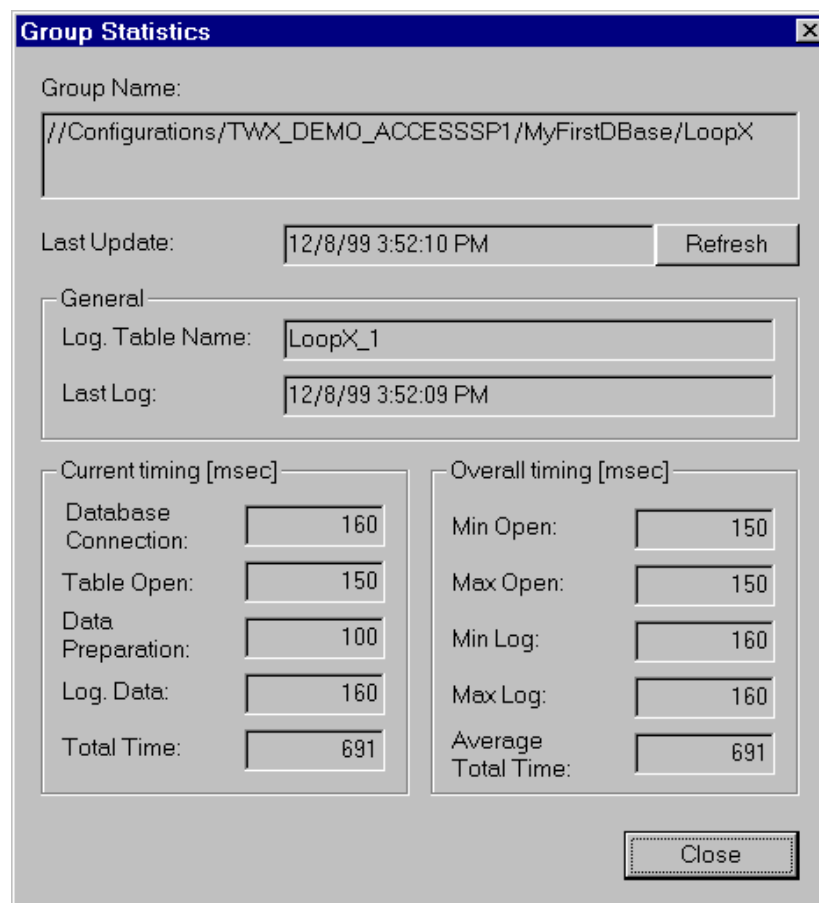
Status. This communicates the status of the server.

Activate. Clicking the **Activate** button activates a logging group. Once the logging group is successfully activated, depending on its configuration, all data-logging and data-collection activity for the selected group will begin.

Deactivate. Clicking the **Deactivate** button tells the server to deactivate a logging group. Once the logging group is successfully deactivated, all data-logging and data-collection activity for the selected group will stop.

Group Information

Clicking the **Get Statistics** button opens the **Group Statistics** dialog box, shown below. This dialog box has two main sections: **Current Timing** and **Overall Timing**.



The **Group Statistics** dialog box displays the following information:

- Group Name:** //Configurations/TWX_DEMO_ACCESSSP1/MyFirstDBase/LoopX
- Last Update:** 12/8/99 3:52:10 PM (with a **Refresh** button)
- General** section:
 - Log. Table Name:** LoopX_1
 - Last Log:** 12/8/99 3:52:09 PM
- Current timing [msec]** section:

Database Connection:	160
Table Open:	150
Data Preparation:	100
Log. Data:	160
Total Time:	691
- Overall timing [msec]** section:

Min Open:	150
Max Open:	150
Min Log:	160
Max Log:	160
Average Total Time:	691
- Close** button

Group Statistics Dialog Box

Current timing. This section shows the time:

- To get a database connection.
- For a table to open.
- For data preparation.

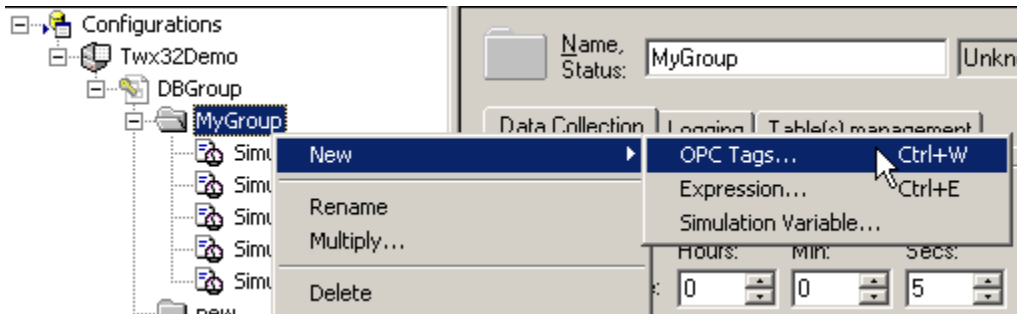
- To log data.
- Since the logging group last logged historical data to the database (in seconds).

Overall timing. This section shows the minimum and maximum time for the server to open a group. It also shows the minimum and maximum time it took for data logging since the logging group entered data-collection and data-logging mode.

Note: If the maximum time to open or log keeps increasing, there might be a problem with your server or overall available system and hardware resources.

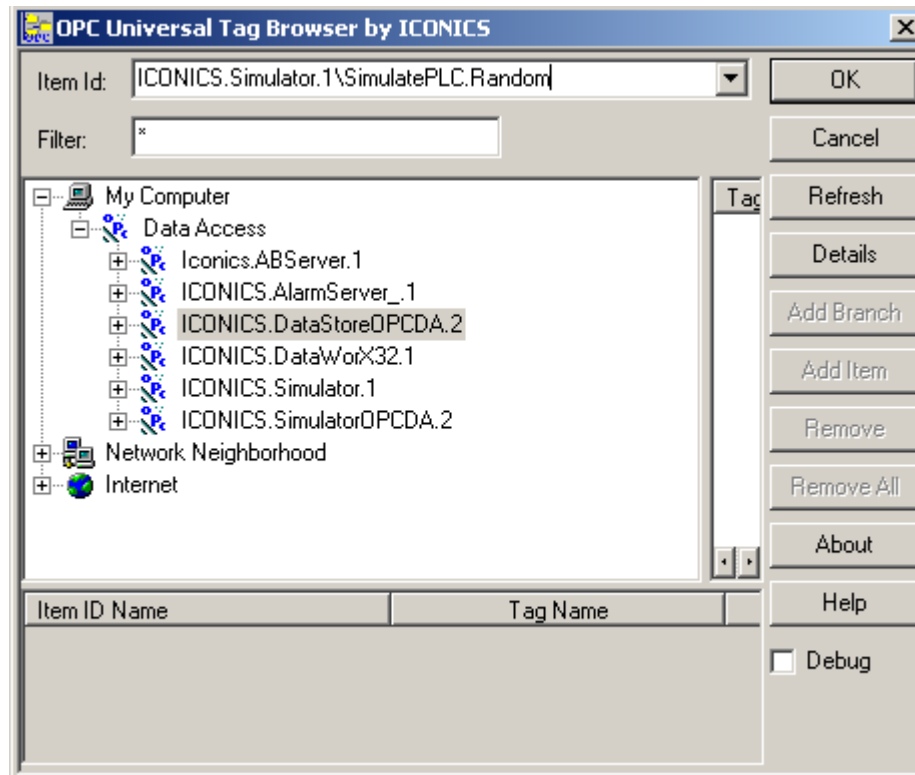
Creating a New Tag

There are three sources for new tags: OPC data tags, expressions, and simulated variables. To create a new tag, right-click the group you have just created. Select **New** and then **OPC Tag**, **Expression** or **Simulated Variable** from the pop-up menu. If you select **Expression**, the **Edit Expression** dialog box will open. If you select **OPC Tag**, the **OPC Universal Tag Browser** will open as shown below.



Creating a New Tag

Note: Currently, TrendWorX32 SQL Data Logger does *not* support data logging of string type tags (signals).



OPC Universal Tag Browser

The **OPC Universal Tag Browser** allows you to navigate all of the installed OPC servers on the local computer or a network. Use the left-hand pane to find the desired tag. Then click **OK**. Click any of the OPC servers that are displayed to select a tag that you wish to configure. The tag name, which uniquely identifies the data item, will be displayed in the **Item ID** field at the top of the **OPC Universal Tag Browser** dialog box. Click **Add Item** to add the tag, which will now be displayed at the bottom of the **OPC Universal Tag Browser** dialog box, as shown above. The tag you have just added will be displayed in the Configurator screen at the **Tag** level and under the **Group** level, as shown in the figure below. Configure the fields described below, and then click **Apply** to implement the configuration.

The screenshot shows the 'Data Logging Tag Configuration' dialog box. It contains the following fields and controls:

- Signal Name:** A text field containing 'ICONICS.Simulator.1\SimulatePLC.Random'.
- Description:** A text field containing 'SimulatePLC.Random'.
- Logging Name:** A text field containing 'SimulatePLC.Random'.
- Eng. units:** An empty text field with a dropdown arrow.
- Ranges:**
 - Hi Limit:** A text field containing '100'.
 - Lo Limit:** A text field containing '0'.
 - Update ranges on start:** An unchecked checkbox.
- Deadband:**
 - Absolute:** A selected radio button.
 - Percent:** An unselected radio button.
 - Value:** A text field containing '0'.
- Log to disk:**
 - All Samples:** A selected radio button.
 - Running Max:** An unselected radio button.
 - Max:** An unselected radio button.
 - Running Min:** An unselected radio button.
 - Min:** An unselected radio button.
 - Running Avg:** An unselected radio button.
 - Avg:** An unselected radio button.
 - Moving Max:** An unselected radio button.
 - Std. Dev.:** An unselected radio button.
 - Moving Min:** An unselected radio button.
 - Totalizer:** An unselected radio button.
 - Moving Avg:** An unselected radio button.
 - Use calculation period:** An unchecked checkbox.
- Buttons:** 'Apply', 'Reset', and 'Add New Tag' at the bottom.

Data Logging Tag Configuration

Each group maintains a collection of individual tags. These signals can be OPC signals or calculated signals. Each signal can be configured with respect to various attributes, such as deadband and logging.

Signal name. The **Signal Name** field shows the actual signal (point) name or expression. When you click the tag name in the left-hand pane of the TrendWorX32 Configurator screen, the tag name or ID, which uniquely identifies the tag will be displayed in the **Signal Name** field, as shown above.

Description. This new field contains a description of the actual signal. For

Unicode applications, the description can be language-aliased so that trend clients will use the translated description during animation (runtime) mode. TrendWorX32 Reporting now uses the Description text on a per-report tag basis. This option, if used, will label the resulting data columns of the target report using the defined Description entries in the TrendWorX32 Configurator. By default, when a signal is inserted in the TrendWorX32 Configurator, the Description entry of the signal will be its logging name. You can override the **Description** field, which will be used to label the resulting data column in the final report. If the **Description** field in the TrendWorX32 Configurator is left empty, the logging name will be used to label the resulting data column of the report. The TrendWorX32 Reporting application will still display in the tree view or edit dialogs the report tags using their logging names.

In addition, for the Unicode version of TrendWorX32 Reporting, the **Description** field can be language-aliased to be used with various languages.

Logging name. Initially the signal's **Logging Name** is set to match the actual tag's (point) name. You can override this setting and choose a more appropriate name such as "Temperature Measurement". This, in turn, will represent the "**signal name**" by which Historian clients will **access** the data logged for that signal. If the signal is an expression, its logging name should be replaced with a description that does not include expression specific syntax.

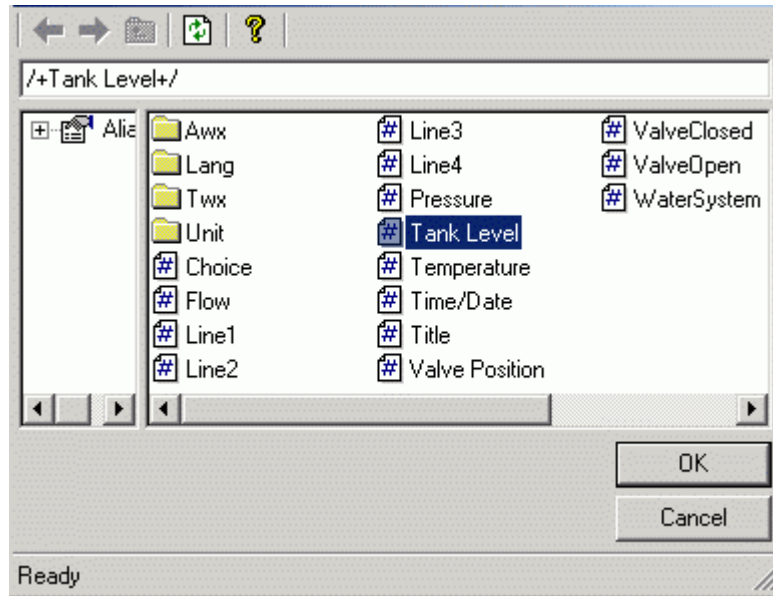
Note: You can configure the same OPC Tag for data logging multiple times under the same logging group in order to log historical information for the tag using various data-logging filters. However, the corresponding logging names must be different so that the historical replay will clearly identify the related tags.

Note: Avoid using long logging names. If reporting will be used, logging names should be a maximum of 60 characters. If the tag is an expression, the logging name should be modified not to contain expression symbols or mathematical symbols. In addition, avoid using special characters, such as @, #, &, *, \$, !, ^, %, ~, and ?.

Engineering units. This field allows you to enter engineering units that will be used. For a Unicode application, the **Eng. Units** field can be language-aliased, and as a direct result, the trend clients will scale the historical data upon switching to a new language.

When specifying a language alias in the **Description** and **Eng. units** fields, you can also select a language alias from the **Language Alias Browser**, which includes all language aliases in the language database. This eliminates the need to manually type in the alias name. Clicking the ... button opens the **Language Alias Browser**, as shown in the figure below. The browser includes all languages aliases in the language configuration database. All language aliases that are configured in the Language

Configurator are conveniently available to choose from inside the browser. The tree control of the Language Configurator is mimicked in the tree control of the Language Alias Browser. Select a language alias by double-clicking the alias name. The alias name appears at the top of the browser, which automatically adds the /+ and +/ delimiters to the alias name. Click the **OK** button.



Selecting an Alias From the Language Alias Browser

Deadband. Each group can also have an individual data-logging deadband and filter for each tag (signal) it maintains. For instance, you may choose to log data for all values retrieved from a certain OPC data server, or for the average of the values over a period of time. In addition, you can configure a deadband value (absolute or percentage) for each signal.

The **Deadband** field allows you to specify a specific (absolute) operational value or a percentage of operation value a signal must change before the server updates with the new value. The deadband is always computed using the most recent sample value, and it is *not* based on the High/Low range sample information. A deadband value of 0 results in storing all samples to the database.

Ranges. The **Hi Limit** field allows you to set the values for the high limit. The **Lo Limit** field allows you to set the values for low limit. In addition, if **Update Ranges on Start** is checked, the ranges for each tag will be refreshed from the OPC server. This ensures that ranges for this tag will be updated at the start of data logging.

Log to Disk

Clicking the Simple/Advanced button hides/shows the **Log to Disk** options. The **Log to Disk** field allows you to select the value(s) of the signal to log to the disk. If **All Samples** is selected, the server will log all values for that

signal that were collected during that specific data-collection period. **Max** will log the maximum of these values. **Min** will log the minimum of these values. **Avg** will log the average of these values. **Std. Dev.** will log the standard deviation of these values. **Totalizer** will run the totalizer function for these values. **Running Max** will log the running maximum of these values. **Running Min** will log the running minimum of these values. **Running Avg** will log the running average of these values (computed using an exponentially weighted moving average filter). **Moving Min** will log the moving minimum of these values. **Moving Max** will log the moving maximum of these values. **Moving Avg** will log the moving average of these values (computed using a **Moving Average** filter). These functions are described below in greater detail.

All samples. Writes to the database all samples collected for the specific tag within each logging-to-disk period.

Maximum. Writes to the database the maximum value of all samples collected for the specific tag, calculating the maximum value over the calculation period defined for the logging group (if enabled). If the calculation period is *not* enabled, the entire maximum value for all the available samples at the time of writing to disk will be logged to the database.

Minimum. Writes to the database the minimum value of all samples collected for the specific tag, calculating the minimum value over the calculation period defined for the logging group (if enabled). If the calculation period is *not* enabled, the entire minimum value for all the available samples at the time of writing to disk will be logged to the database.

Average. Writes to the database the average value of all samples collected for the specific tag, calculating the average value over the calculation period defined for the logging group (if enabled). If the calculation period is *not* enabled, the entire average value for all the available samples at the time of writing to disk will be logged to the database.

Standard deviation. Writes to the database the standard deviation value of all samples collected for the specific tag, calculating the standard deviation value over the calculation period defined for the logging group (if enabled). If the calculation period is *not* enabled, the entire standard deviation value for all the available samples at the time of writing to disk will be logged to the database.

Totalizer. If the **Totalizer** data-logging filter is selected, there are additional options that you can select or enable, as shown in the figure below.

Totalizer Field in Tag Configuration Dialog Box

The Totalizer field contains the following options:

- The **Units** field sets the integration constant for the totalizer filter. It can be seconds, minutes, hours, or days.
- The **Type** field sets the type of totalizer filter, which can be "Continuous," "Preload," or "Preset."
- The **Initial/Preset Value** field sets the Initial (Pre-loaded) or Preset value based on the totalizer type used.
- The **Autoreset** field sets the autoreset mode and value of the totalizer. It can be value-based or time-interval based, as shown in the figure below. Once the condition is met, the totalizer will reset to the configured levels.
- The **Count Options** field sets the integration direction of the totalizer. It can be "Upward" (from a given value) or "Downward" (to a given value).

Autoreset Options

Running maximum. Writes to the database the running maximum value of all samples collected for the specific tag, continuously calculating the maximum value over the entire data-logging period.

Running minimum. Writes to the database the running minimum value of all samples collected for the specific tag, continuously calculating the minimum value over the entire data-logging period.

Running average. Writes to the database the running average value of all samples collected for the specific tag, calculating the running average value over the entire data-logging period using an exponentially weighted moving average (EWMA) filter equation.

If the calculation period is enabled for the tag, and no new samples are received within the calculation time period, the Data Logger will use the last known value to provide a more accurate EWMA estimate. In addition, if new samples are being received irregularly, the Data Logger will try to "backfill" missing samples (by using the last known value) in order to provide a more-accurate EWMA estimate. This way the Data Logger accommodates slowly changing signals, which, due to the event nature of OPC data updates, change less frequently than the desired data collection. If the calculation period is *not* enabled, the Data Logger will still try to "backfill" missing samples (by using the last known value), but no new historical values will be entered to the database until a new (updated) sample arrives. The following EWMA filter equation used is :

$$\text{EWMA}(n) = \text{coefficient} * \text{Measurement}(n) + (1 - \text{coefficient}) * \text{EWMA}(n-1)$$

In this equation, n is the sample count, and *coefficient* is a constant typically chosen to be between 0 and 1. From this equation, we can view the EWMA estimate as a weighted average of all past and current measurements, with the coefficients of each new measurement declining geometrically. From this point of view, it is an ideal filter equation to use in the case of random individual measurements. In order to accelerate the filter convergence, the Data Logger will use the following equation:

$$\text{EWMA}(n) = (1/n+1) * \text{Measurement}(n) + (n/n+1) * \text{EWMA}(n-1)$$

Until $n = 32$ (i.e. using the first 32 samples). After the first 32 samples, the value of the coefficients in the EWMA equation will stay constant.

Moving maximum. This option is new in Version 6.10. It is similar to the moving average except that it computes the moving maximum value of the samples collected.

Moving minimum. This option is new in Version 6.10. It is similar to the moving average except that it computes the moving minimum value of the samples collected.

Moving average. Writes to the database the moving average value of all samples collected for the specific tag, calculating the moving average value over the entire data-logging period using a **Moving Average** filter equation similar to the one used by Microsoft Excel, where the moving average for each period is based on the average value of the tag over a specific number of preceding periods.

If the calculation period is enabled for the tag, the Data Logger will use the calculation period to define the order of the moving average filter. By default, it will use a fourth order filter, which means that four previous samples will be used in computing a moving average estimate for each time interval. Also, if no new samples are received within the calculation time period, the Data Logger will use the last known value to provide a more accurate moving average estimate.

In addition, if new samples are being received irregularly, the Data Logger will try to "backfill" missing samples (by using the last known value) in order to provide a more accurate moving average estimate. This way, the Data Logger accommodates slowly changing signals, which, due to the event nature of OPC data updates, change less frequently than the desired data collection. If the calculation period is *not* enabled, the Data Logger will still try to "backfill" missing samples (by using the last known value), but no new historical values will be entered to the database until a new (updated) sample arrives.

Note: For all data-logging filters in which calculation is involved, the quality of the "calculated" sample is based upon the qualities of the samples participating in the calculation. If any of them are bad, the calculated sample will be marked with bad quality. For running averages, if the quality of the new sample coming in is bad, the historical sample logged to the database will have the last EWMA computed value, with updated time stamp (the time stamp of the actual sample) and uncertain quality.

Note: TrendWorX32 SQL Server supports a variety of data-logging filters, which you can customize to meet specific needs. These filters can also provide considerable levels of data-logging compression and disk space savings. For example, if you are setting up a monitoring application at a high-speed data-collection rate, where only certain statistical values are required to be historically archived, the usage of data-collection filters and calculation period can considerably save disk space used for data storage and improve historical data replay performance.

Use calculation period. Checking this box ensures that the calculation period set at the **Group** level settings will be used.

Troubleshooting Data Logging

Using a technology that has been incorporated into all ICONICS products, TraceWorX32 provides online diagnostics and tuning of applications running in the GENESIS32 system. TraceWorX32 is designed expressly for systems integrators, OEMs and customers who want to have tools for doing their own troubleshooting and diagnostics.

TraceWorX32 tracks the runtime activity for the TrendWorX32 SQL Data Logger and logs the runtime data to a log file based on user-configured trace levels. The log file provides a thorough, color-coded report detailing all activity for the application, including the time, the date, the severity level, and a description of the event or problem.

TraceWorX32 also features several options for reporting issues to technical support. If you are experiencing problems with any applications, the log file deployment options, such as compressing and e-mailing log files, are ideal for tracking and archiving data and sending detailed reports to technical support. Developers can use these reports to identify the source of the problems.

Please see the TraceWorX32 Help documentation for more information.