

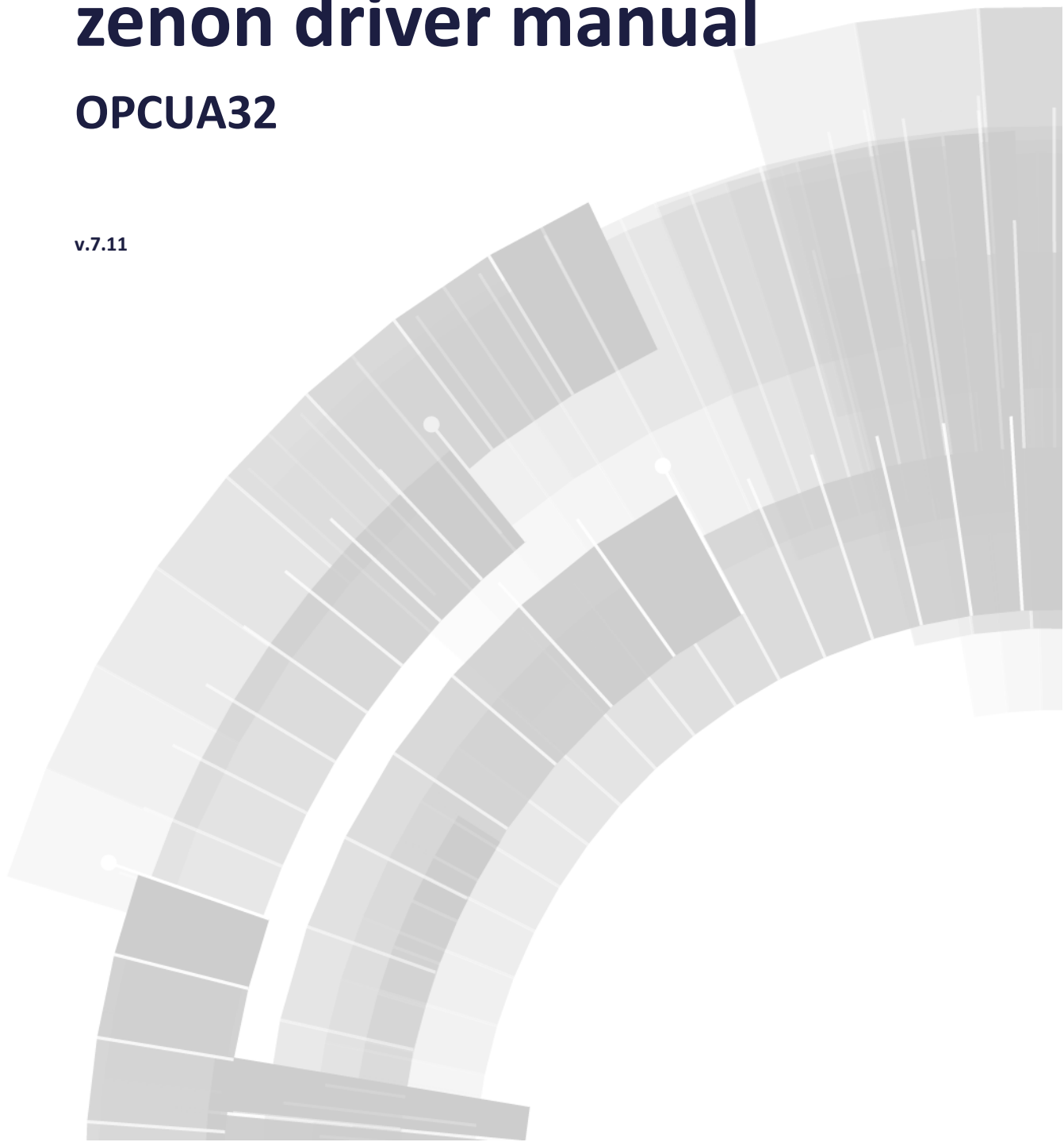


COPADATA
do it your way

zenon driver manual

OPCUA32

v.7.11





©2014 Ing. Punzenberger COPA-DATA GmbH

All rights reserved.

Distribution and/or reproduction of this document or parts thereof in any form are permitted solely with the written permission of the company COPA-DATA. The technical data contained herein has been provided solely for informational purposes and is not legally binding. Subject to change, technical or otherwise.

Contents

| | |
|---|-----------|
| 1. Welcome to COPA-DATA help | 5 |
| 2. OPCUA32 | 5 |
| 3. OPCUA32 - Data sheet | 6 |
| 4. Driver history | 7 |
| 5. Requirements..... | 8 |
| 5.1 PC | 8 |
| 5.2 Control | 8 |
| 6. Configuration | 9 |
| 6.1 Creating a driver..... | 9 |
| 6.2 Settings in the driver dialog | 11 |
| 6.2.1 General | 12 |
| 6.2.2 Connections..... | 15 |
| 7. Creating variables..... | 23 |
| 7.1 Creating variables in the Editor..... | 23 |
| 7.2 Addressing..... | 26 |
| 7.3 Driver objects and datatypes | 28 |
| 7.3.1 Driver objects | 28 |
| 7.3.2 Mapping of the data types | 28 |
| 7.4 Creating variables by importing | 29 |
| 7.4.1 XML import..... | 30 |
| 7.4.2 DBF Import/Export | 30 |
| 7.4.3 Online import | 37 |
| 7.5 Driver variables | 38 |
| 8. Driver-specific functions | 44 |
| 9. Driver commands | 45 |
| 10. Error analysis..... | 47 |

| | | |
|------|---------------------|----|
| 10.1 | Analysis tool | 47 |
| 10.2 | Check list | 48 |

1. Welcome to COPA-DATA help

GENERAL HELP

If you cannot find any information you require in this help chapter or can think of anything that you would like added, please send an email to documentation@copadata.com (<mailto:documentation@copadata.com>).

PROJECT SUPPORT

You can receive support for any real project you may have from our Support Team, who you can contact via email at support@copadata.com (<mailto:support@copadata.com>).

LICENSES AND MODULES

If you find that you need other modules or licenses, our staff will be happy to help you. Email sales@copadata.com (<mailto:sales@copadata.com>).

2. OPCUA32

OPC UA stands for **OPC Unified Architecture**. The driver is used for communicating with OPC UA servers and is based on the official stack of the OPC foundation. Its main features:

- ▶ spontaneous communication, i.e. modified variables are automatically reported by the server,
- ▶ the driver supports several servers
- ▶ the variables can be read directly from the server

- variables are addressed via the **Browse Name** defined in the standard

3. OPCUA32 - Data sheet

| General: | |
|------------------|--|
| Driver file name | OPCUA32.exe |
| Driver name | OPC UA Client driver |
| PLC types | All OPC-UA server with Data Access communication |
| PLC manufacturer | OPC; |

| Driver supports: | |
|---------------------------|---------|
| Protocol | OPC-UA; |
| Addressing: Address-based | - |
| Addressing: Name-based | x |
| Spontaneous communication | x |
| Polling communication | - |
| Online browsing | x |
| Offline browsing | - |
| Real-time capable | x |
| Blockwrite | - |
| Modem capable | - |
| Serial logging | - |

| | |
|---------------|---|
| RDA numerical | - |
| RDA String | - |

| Requirements: | |
|----------------|---|
| Hardware PC | - |
| Software PC | - |
| Hardware PLC | - |
| Software PLC | - |
| Requires v-dll | x |

| Platforms: | |
|-------------------|---|
| Operating systems | Windows CE 6.0, Embedded Compact 7; Windows Vista, 7, 8, 8.1 Server 2008/R2, Server 2012/R2; |
| CE platforms | x86; ARM; |

4. Driver history

| Date | Driver version | Change |
|----------|----------------|------------------------------|
| 07.07.08 | 100 | Created driver documentation |

DRIVER VERSIONING

The versioning of the drivers was changed with zenon 7.10. There is a cross-version build number as of this version. This is the number in the 4th position of the file version,

For example: 7.10.0.4228 means: The driver is for version 7.10 service pack 0, and has the build number 4228.

Expansions or error rectifications will be incorporated into a build in the future and are then available from the next consecutive build number.



Example

A driver extension was implemented in build 4228. The driver that you are using is build number 8322. Because the build number of your driver is higher than the build number of the extension, the extension is included. The version number of the driver (the first three digits of the file version) do not have any significance in relation to this. The drivers are version-agnostic

5. Requirements

This chapter contains information on the requirements that are necessary for use of this driver.

5.1 PC

This driver supports a connection via the standard network card of the PC. In order for PC and PLC to communicate:

- the PLC and the PC must be in the same network range
- the subnet masks must be configured accordingly on both devices
- the driver file `OPCUA32.exe` must be in the current zenon installation folder

5.2 Control

The PLC has to support the OPC Unified Architecture Protocol with the OPC Binary Transport.

Note: OPC UA Web services are not supported.

6. Configuration

In this chapter you will learn how to use the driver in a project and which settings you can change.



Information

Find out more about further settings for zenon variables in the chapter Variables (main.chm::/15247.htm) of the online manual.

6.1 Creating a driver

In order to create a new driver:

1. Right-click on **Driver** in the Project Manage and select **Driver new** in the context menu.

2. In the following dialog the control system offers a list of all available drivers.



3. Select the desired driver and give it a name:
- The driver name has to be unique, i.e. if one and the same driver is to be used several times in one project, a new name has to be given each time.
 - The driver name is part of the file name. Therefore it may only contain characters which are supported by the operating system. Invalid characters are replaced by an underscore (_).

- **Attention:** This name cannot be changed later on.
4. Confirm the dialog with **OK**. In the following dialog the single configurations of the drivers are defined.

Only the respective required drivers need to be loaded for a project. Later loading of an additional driver is possible without problems.



Information

For new projects and for existing projects which are converted to version 6.21 or higher, the following drivers are created automatically:

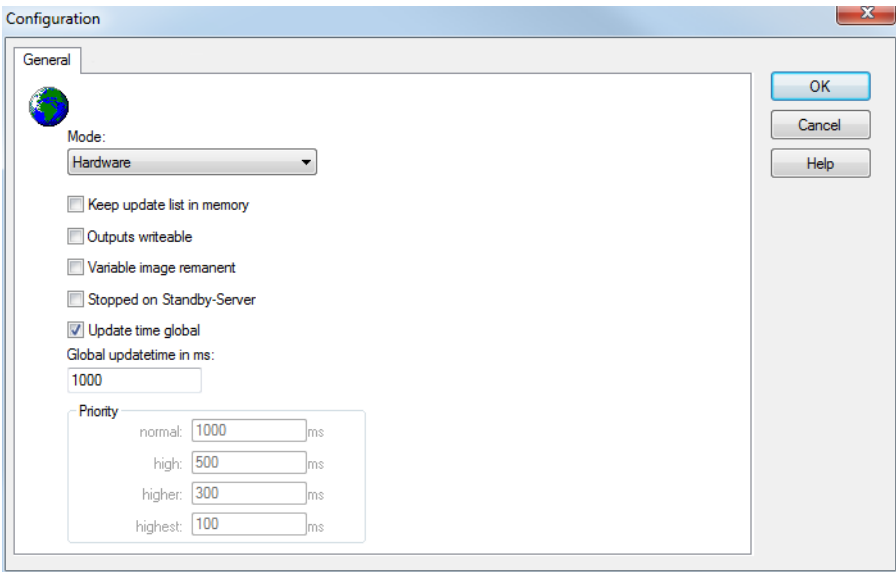
- ▶ Internal
- ▶ MathDr32
- ▶ SysDrv.

▶

6.2 Settings in the driver dialog

You can change the following settings of the driver:

6.2.1 General



| Parameters | Description |
|--------------------------------|---|
| Mode | <p>Allows to switch between hardware mode and simulation mode</p> <ul style="list-style-type: none"> ▶ Hardware: A connection to the control is established. ▶ Simulation static No communication between to the control is established, the values are simulated by the driver. In this modus the values remain constant or the variables keep the values which were set by straton. Each variable has its own memory area. E.g. two variables of the type marker with offset 79 can have different values in the Runtime and do not influence each other. Exception: The simulator driver. ▶ Simulation - counting No communication between to the control is established, the values are simulated by the driver. In this modus the driver increments the values within a value range automatically. ▶ Simulation - programmed N communication is established to the PLC. The values are calculated by a freely programmable simulation project. The simulation project is created with the help of the straton Workbench and runs in a straton Runtime which is integrated in the driver. For details see chapter Driver simulation (main.chm::/25206.htm). |
| Keep update list in the memory | <p>Variables which were requested once are still requested from the control even if they are currently not needed.</p> <p>This has the advantage that e.g. multiple screen switches after the screen was opened for the first time are executed faster because the variables need not be requested again. The disadvantage is a higher load for the communication to the control.</p> |
| Outputs writeable | <p>Active: Outputs can be written.</p> <p>Inactive: Writing of outputs is prevented.</p> <p>Note: Not available for every driver.</p> |

| | |
|---------------------------|---|
| Variable image remanent | <p>This option saves and restores the current value, time stamp and the states of a data point.</p> <p>Fundamental requirement: The variable must have a valid value and time stamp.</p> <p>The variable image is saved in mode hardware if:</p> <ul style="list-style-type: none"> ▶ one of the states S_MERKER_1(0) up to S_MERKER8(7), REVISION(9), AUS(20) or ERSATZWERT(27) is active <p>The variable image is always saved if:</p> <ul style="list-style-type: none"> ▶ the variable is of the object type <code>Driver variable</code> ▶ the driver runs in simulation mode. (not programmed simulation) <p>The following states are not restored at the start of the Runtime:</p> <ul style="list-style-type: none"> ▶ SELECT(8) ▶ WR-ACK(40) ▶ WR-SUC(41) <p>The mode Simulation - programmed at the driver start is not a criterion in order to restore the remanent variable image.</p> |
| Stopped on Standby Server | <p>Setting for redundancy at drivers which allow only on communication connection. For this the driver is stopped at the Standby Server and only started at the upgrade.</p> <p>Attention: If this option is active, the gapless archiving is no longer guaranteed.</p> <p>Active: Sets the driver at the not-process-leading Server automatically in a stop-like state. In contrast to stopping via driver command, the variable does not receive status switched off (<code>statusverarbeitung.chm: :/24150.htm</code>) but an empty value. This prevents that at the upgrade to the Server irrelevant values are created in the AML, CEL and Historian.</p> |
| Update time global | <p>Active: The set <code>Update time global</code> in ms is used for all variables in the project. The priority set at the variables is not used.</p> <p>Inactive: The set priorities are used for the individual variables.</p> |
| Priority | <p>Here you set the polling times for the individual priorities. All variables with the according priority are polled in the set time. The allocation is taken</p> |

| | |
|---------------|--|
| | place for each variable separately in the settings of the variable properties. The communication of the individual variables are graduated in respect of importance or necessary topicality using the priorities. Thus the communication load is distributed better. |
| OK | Accepts settings in all tabs and closes dialog. |
| Cancel | Discards all changes and closes the dialog. |
| Help | Opens online help. |

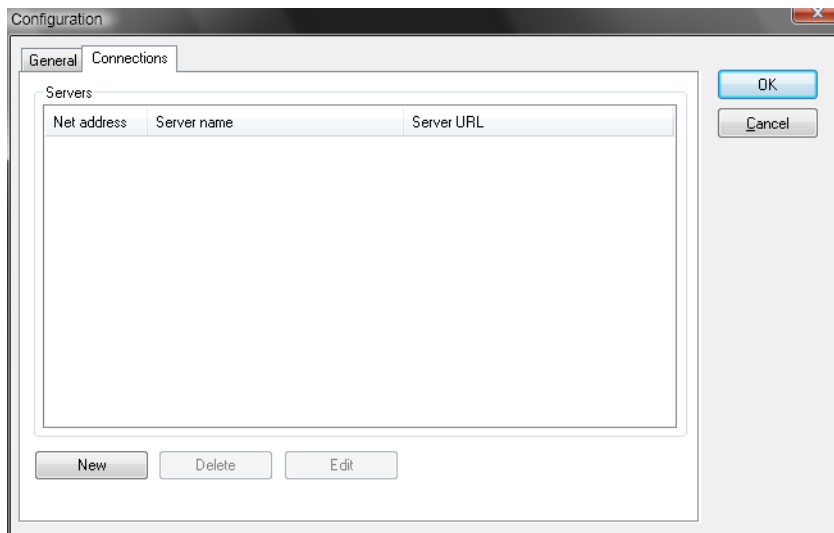
UPDATE TIME FOR CYCLICAL DRIVER

The following applies for cyclical drivers:

For **Set value**, **Advising** of variables and **Requests**, a read cycle is immediately triggered for all drivers - regardless of the set update time. This ensures that the value is immediately available for visualization after writing. Update times can therefore be shorter than pre-set for cyclical drivers.

6.2.2 Connections

Configure the OPC UA connections to the PLCs in the Connections tab.



| Parameters | Description |
|------------|--|
| Servers | Contains the configured connections. Select a connection to delete or modify it. |

| | |
|---------------|---|
| Net address | The net address identifies the connection. Every connection must have a unique net address, which are assigned automatically. Variables are assigned to a connection via the net address. |
| Server name | Freely definable name for the easier distinction of connections. |
| Server URL | The network address which is used to contact the connection terminal of the server. e.g. <code>opc.tcp://server:4840</code> |
| New | Opens the dialog for creating a new connection. |
| Delete | Deletes highlighted entry from the list. |
| Edit | Opens highlighted entry for editing. |
| OK | Applies all changes in all tabs and closes the dialog. |
| Cancel | Discards all changes in all tabs and closes the dialog. |
| Help | Opens online help. |

CREATE NEW CONNECTION

Click on the **New** button. In the following dialog:

- ▶ Define the connection details in the **Communication Settings** (on page 17) tab
- ▶ Set the advanced options under **Advanced settings** (on page 19)
- ▶ Configure the certificates under **Certificates** (on page 22)

EDIT CONNECTION

Select an existing connection in the connection dialog and click the **Edit** button to modify it. The properties for this are identical with the fields displayed when creating a new connection.

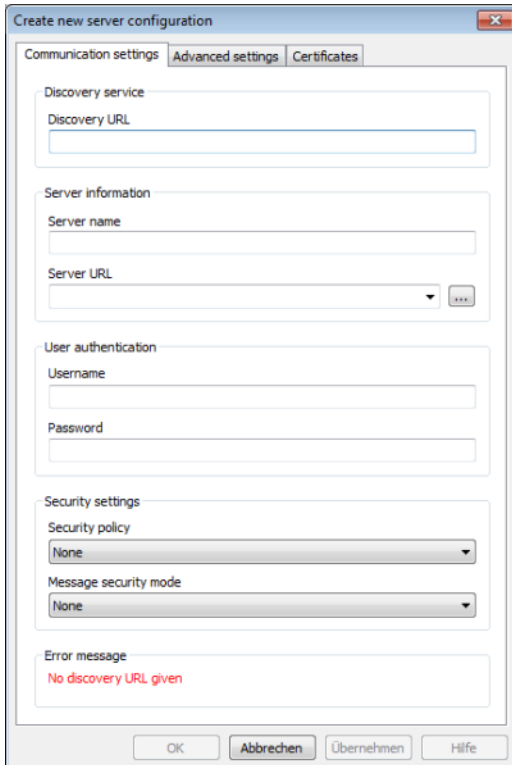
DELETE CONNECTION

To delete a connection:

- ▶ select the connection in the connection list
- ▶ click on the button **Delete**

- the connection will be removed

Communication settings



The screenshot shows a dialog box titled "Create new server configuration" with three tabs: "Communication settings", "Advanced settings", and "Certificates". The "Communication settings" tab is active. It contains several input fields and dropdown menus:

- Discovery service:** A text field labeled "Discovery URL".
- Server information:** A text field labeled "Server name" and a dropdown menu labeled "Server URL" with a "... button" next to it.
- User authentication:** Text fields for "Username" and "Password".
- Security settings:** Two dropdown menus, "Security policy" (set to "None") and "Message security mode" (set to "None").
- Error message:** A text area containing the message "No discovery URL given" in red.

At the bottom, there are four buttons: "OK", "Abbrechen", "Übernehmen", and "Hilfe".

| Parameters | Description |
|-----------------|---|
| Discovery URL | The address of the discovery server, from which the information about existing servers can be requested. |
| Server name | Freely definable name for identifying the connection. |
| Server URL | The network address which is used to contact the connection terminal of the server. Select from drop-down list. Clicking on the ... button starts the search. |
| User name | Optional user name for authentication via User Identity Token. |
| Password | Optional password for authentication via User Identity Token. |
| Security Policy | Security algorithm used for the connection with the server. Look up part 7 of the OPC UA specification for allowed values. |

| | |
|-----------------------|---|
| | The discovery server provides all supported values when reading. |
| Message Security Mode | <p>The message security mode specifies the security level that is used for the transmission of messages. Possible values:</p> <ul style="list-style-type: none"> ▶ None ▶ Sign All messages are signed but not encrypted. ▶ Sign & Encrypt All messages are signed and encrypted. |
| Error Message | Notification about missing or incorrect details. |
| OK | Applies all changes in all tabs and closes the dialog. |
| Cancel | Discards all unsaved changes in all tabs and closes the dialog. |
| Apply | Saves all changes for this tab. |
| Help | Opens online help. |

Hint: Usually only the **Discovery URL** is filled out. The server names and URLs, as well as the allowed security settings, are read off from the discovery server by clicking on the ... button next to the **Server URL** field. You can find details on this authentication in the **Part 4 - 5.6.3 ActivateSession** NORM.

Advanced settings

Edit server configuration

Communication settings | **Advanced settings** | Certificates

Subscription

Publishing interval [ms]
500

Lifetime count
30

Maximum keep-alive count
5

Monitored items

Sampling interval
Default sampling interval defined by publishing rate ▼

Connection

☒ Read initial values on startup

☒ Request array variables on index basis

Error message

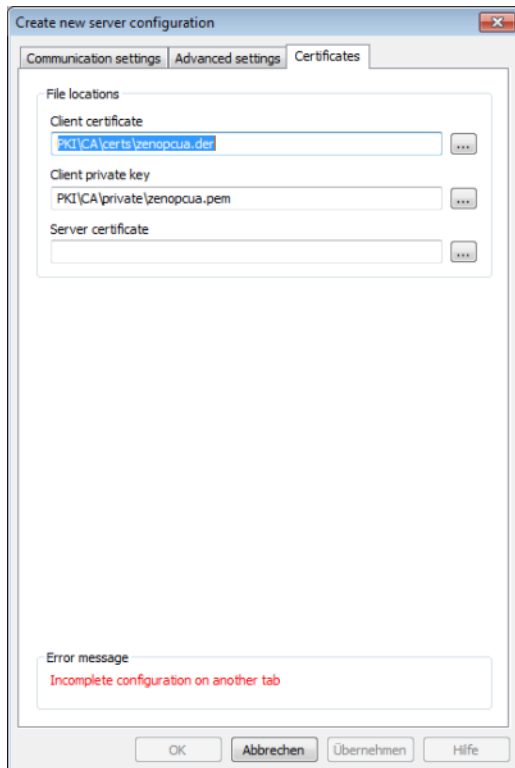
OK Abbrechen Übernehmen Hilfe

| Parameters | Description |
|--------------------------------|---|
| Subscription | Options for the connection. |
| Publishing interval [ms] | <p>Defines the interval (in milliseconds) within which the subscription must send a message.</p> <p>The server can also change this interval downwards upwards in order to adhere to technical limitations.</p> <p>Default: 500</p> |
| Lifetime count | <p>States how often the publishing interval can be exceeded before the subscription is deleted by the server.</p> <p>Values: ≥ 1 and $\geq 3 \times \text{Maximum keep-alive count}$</p> <p>Default: 30</p> |
| Maximum keep-alive count | <p>States how often the publishing interval can run out before a keep-alive message is sent.</p> <p>Values: ≥ 1</p> <p>Default: 5</p> |
| Monitored items | |
| Sampling interval | <p>Sampling interval in milliseconds, within which the monitored items are to be called up and evaluated. The server can also change this interval downwards upwards in order to adhere to technical limitations. Selection from drop-down list or direct entry in field.</p> <p>Possible values:</p> <ul style="list-style-type: none"> ▸ Fastest practical rate ▸ Default sampling interval defined by publishing rate |
| Connection | |
| Read initial values on startup | <p>Active: In addition to signing in the variables (advise) a read request is also transferred.</p> <p>Inactive: No additional read request is sent to the server. The values may be received with a delay, depending on the server.</p> <p>Default: active</p> <p>Recommendation: Select this option if a large amount of variables are to communicate with the server.</p> |

| | |
|--|---|
| Request array variables on index basis | <p>Working with OPC UA array variables.</p> <p>Active: Each array element is signed in as its own variable for a value assessment. Recommendation: Select this option if only a few elements from large arrays are needed.</p> <p>Inactive: The complete array is signed in for value changes. As a result of this, large arrays for which most or all array elements are needed sign in to the server more quickly. However in doing so - even for just a few value changes - the complete array is always transferred. The network load can be increased as a result.</p> <p>Default: active</p> |
| Error Message | Notification about missing or incorrect details. |
| OK | Applies all changes in all tabs and closes the dialog. |
| Cancel | Discards all unsaved changes in all tabs and closes the dialog. |
| Apply | Saves all changes for this tab. |
| Help | Opens online help. |

Certificates

Use the tab **certificates** to configure the certificates:



| Parameters | Description |
|--------------------|--|
| Client Certificate | Public key of the client. Used by the server for encrypting messages. Must be in the certificate path in the ...\certs\ subfolder. |
| Client Private Key | Private key of the client. Used for decrypting server messages. Must be in the certificate path in the ...\private\ subfolder. |
| Server Certificate | Public key of the server. Used for encrypting messages that are sent to the server. |
| Error Message | Notification about missing or incorrect details. |
| OK | Applies all changes in all tabs and closes the dialog. |
| Cancel | Discards all unsaved changes in all tabs and closes the dialog. |
| Apply | Saves all changes for this tab. |
| Help | Opens online help. |

When the driver is initialized for the first time, zenon automatically creates:

- ▶ the certification authority (CA)
- ▶ the client key pair

and copies them to the driver folder.

If you want to import other certificates or a server certificate, use the select button to find them and import them into the driver folder.

7. Creating variables

This is how you can create variables in the zenon Editor:

7.1 Creating variables in the Editor

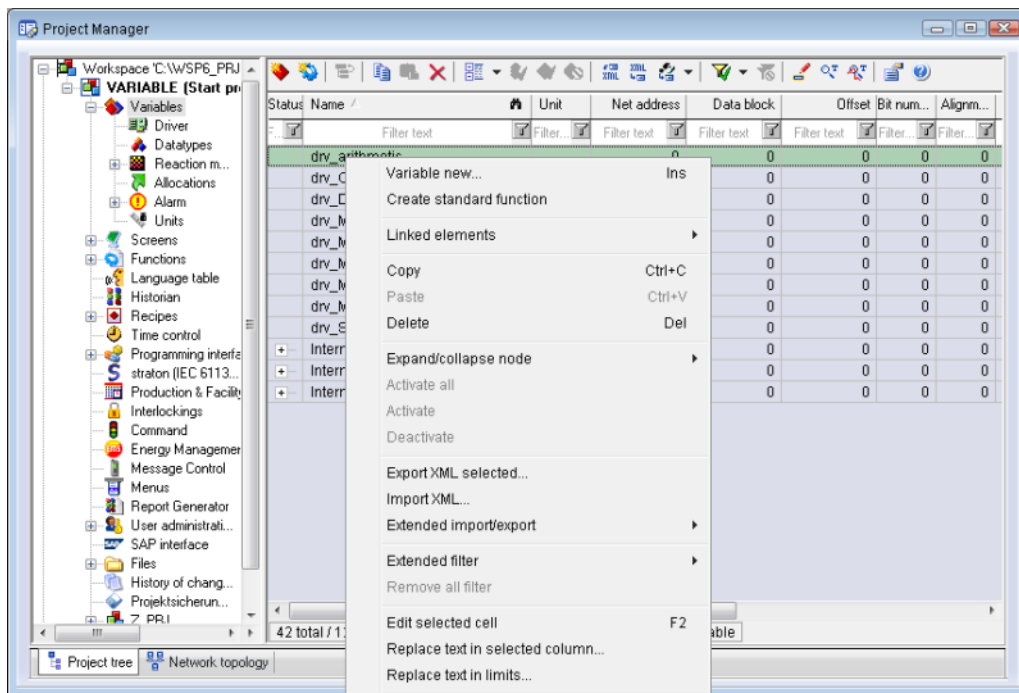
Variables can be created:

- ▶ as simple variables
- ▶ in arrays (main.chm::/15262.htm)
- ▶ as structure variables (main.chm::/15278.htm)

VARIABLE DIALOG

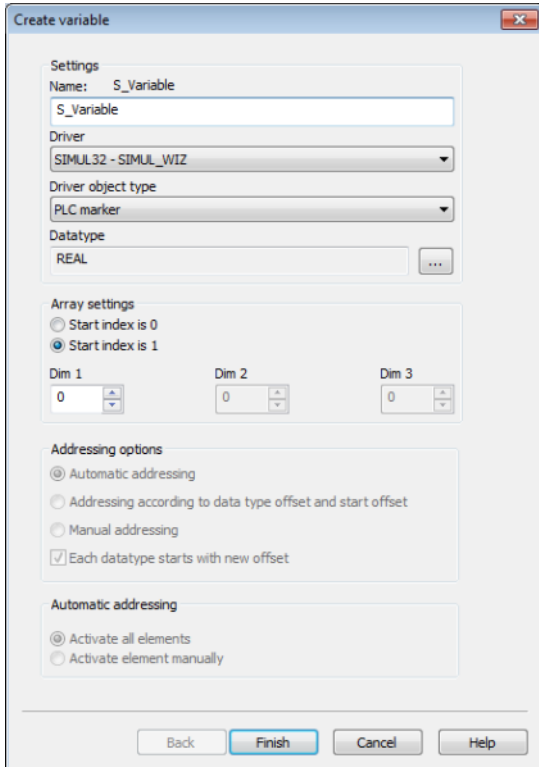
To create a new variable, regardless of which type:

1. Select the **New variable** command in the **Variables** node in the context menu



2. The dialog for configuring variables is opened
3. configure the variable

4. The settings that are possible depends on the type of variables



| Parameters | Description |
|---|---|
| Name | <p>Distinct name of the variable. If a variable with the same name already exists in the project, no additional variable can be created with this name.</p> <p>Maximum length: 128 characters</p> <p>Attention: The characters # and @ are not permitted in variable names. If non-permitted characters are used, creation of variables cannot be completed and the Finish button remains inactive.</p> |
| Drivers | <p>Select the desired driver from the drop-down list.</p> <p>Note: If no driver has been opened in the project, the driver for internal variables (Intern.exe (Main.chm::/Intern.chm::/Intern.htm)) is automatically loaded.</p> |
| Driver object type (cti.chm::/28685.htm) | Select the appropriate driver object type from the drop-down list. |

| | |
|------------------------------|---|
| Data type | Select the desired data type. Click on the ... button to open the selection dialog. |
| Array settings | Expanded settings for array variables. You can find details in the Arrays chapter. |
| Addressing options | Expanded settings for arrays and structure variables. You can find details in the respective section. |
| Automatic element activation | Expanded settings for arrays and structure variables. You can find details in the respective section. |

INHERITANCE FROM DATA TYPE

Measuring range, Signal range and Set value are always:

- ▶ derived from the datatype
- ▶ Automatically adapted if the data type is changed

Note for signal range: If a change is made to a data type that does not support the set signal range, the signal range is amended automatically. For example, for a change from **INT** to **SINT**, the signal range is changed to 127. The amendment is also carried out if the signal range was not inherited from the data type. In this case, the measuring range must be adapted manually.

7.2 Addressing

You define the addressing of the variables in the property window:

| Group/Property | Description |
|--------------------------------------|--|
| General | |
| Name | <p>Freely definable name.</p> <p>Attention: The name must be unique for every zenon project.</p> |
| Identification | Any text can be entered here, e.g. for resource labels, comments ... |
| Addressing | |
| Net address | This address refers to the bus address in the connection configuration of the driver. This defines the PLC, on which the variable resides. |
| Data block | not used for this driver |
| Offset | Offset of the variable; the memory address of the variable in the PLC. Adjustable from 0 to 4294967295. |
| Alignment | Alignment for variables with byte length 1. You can choose between low byte and high byte. |
| Bit number | not used for this driver |
| String length | Only available for String variables: Maximum number of characters that the variable can take. |
| Driver connection/Driver object type | Depending on the employed driver, an object type is selected during the creation of the variable; the type can be changed here later. |
| Driver connection/Data type | <p>Data type of the variable, which is selected during the creation of the variable; the type can be changed here later.</p> <p>ATTENTION: If you change the data type later, all other properties of the variable must be checked and adjusted, if necessary.</p> |
| Browse name | <p>Equals the Browse name of the OPC UA specification. Only hierarchic references (forward) starting from the object folder are allowed. For example: 9:Data/9:Dynamic/9:Scalar/9:UInt32Value or Server/ServerStatus/StartTime.</p> <p>The preceding number in the first example specifies the used name space index of the variable.</p> |

7.3 Driver objects and datatypes

Driver objects are areas available in the PLC, such as markers, data blocks etc. Here you can find out which driver objects are provided by the driver and which IEC data types can be assigned to the respective driver objects.

7.3.1 Driver objects

The following object types are available in this driver:

| Driver object type | Channel type | Read / Write | Supported data types | Description |
|--------------------|--------------|--------------|--|--|
| PLC marker | 8 | R / W | BOOL, SINT, USINT, INT, UINT, DINT, UDINT, REAL, LREAL, STRING | |
| Driver variable | 35 | R / W | BOOL, SINT, USINT, INT, UINT, DINT, UDINT, REAL, STRING | Variables for the statistical analysis of communication. Find out more in the chapter about the Driver variables (on page 38) |

7.3.2 Mapping of the data types

All variables in zenon are derived from IEC data types. The following table compares the IEC datatypes with the datatypes of the PLC.

| Control | zenon | Data type |
|----------------|-------------------|-----------|
| OpcUa_Boolean | BOOL | 8 |
| OpcUa_Byte | USINT | 9 |
| OpcUa_SByte | SINT | 10 |
| OpcUa_UInt16 | UINT | 2 |
| OpcUa_Int16 | INT | 1 |
| OpcUa_UInt32 | UDINT | 4 |
| OpcUa_Int32 | DINT | 3 |
| OpcUa_UInt64 | ULINT | 27 |
| OpcUa_Int64 | LINT | 26 |
| OpcUa_Float | REAL | 5 |
| OpcUa_Double | LREAL | 6 |
| OpcUa_String | STRING | 12 |
| - | WSTRING | 21 |
| - | DATE | 18 |
| - | TIME | 17 |
| OpcUa_DateTime | DATE_AND_TIME | 20 |
| - | TOD (Time of Day) | 19 |

Data type: The property `Data type` is the internal numerical name of the data type. It is also used for the extended DBF import/export of the variables.

7.4 Creating variables by importing

Variables can also be imported by importing them. The XML and DBF import is available for every driver.



Information

You can find details on the import and export of variables in the Import-Export (main.chm::/13028.htm) manual in the Variables (main.chm::/13045.htm) section.

7.4.1 XML import

For the import/export of variables the following is true:

- ▶ The import/export must not be started from the global project.
- ▶ The start takes place via:
 - Context menu of variables or data typ in the project tree
 - or context menu of a variable or a data type
 - or symbol in the symbol bar variables



Attention

When importing/overwriting an existing data type, all variables based on the existing data type are changed.

Example:

There is a data type XYZ derived from the type `INT` with variables based on this data type. The XML file to be imported also contains a data type with the name XYZ but derived from type `STRING`. If this data type is imported, the existing data type is overwritten and the type of all variables based on it is adjusted. I.e. the variables are now no longer `INT` variables, but `STRING` variables.

7.4.2 DBF Import/Export

Data can be exported to and imported from dBase.



Information

Import and Export via CSV or dBase supported; no driver specific variable settings, such as formulas. Use export/import via XML for this.

IMPORT DBF FILE

To start the import:

1. right-click on the variable list
2. in the drop-down list of **Extended export/import...** select the **Import dBase** command
3. follow the import assistant

The format of the file is described in the chapter File structure.



Information

Note:

- ▶ Driver object type and data type must be amended to the target driver in the DBF file in order for variables to be imported.
- ▶ dBase does not support structures or arrays (complex variables) at import.

EXPORT DBF FILE

To start the export:

1. right-click on the variable list
2. in the drop-down list of **Extended export/import...** select the **Export dBase...** command
3. follow the export assistant



Attention

DBF files:

- ▶ must correspond to the 8.3 DOS format for filenames (8 alphanumeric characters for name, 3 character suffix, no spaces)
- ▶ must not have dots (.) in the path name.
e.g. the path `C:\users\John.Smith\test.dbf` is invalid.
Valid: `C:\users\JohnSmith\test.dbf`
- ▶ must be stored close to the root directory in order to fulfill the limit for file name length including path: maximum 255 characters

The format of the file is described in the chapter File structure.



Information

dBase does not support structures or arrays (complex variables) at export.

File structure of the dBase export file

The dBaseIV file must have the following structure and contents for variable import and export:



Attention

dBase does not support structures or arrays (complex variables) at export.

DBF files must:

- ▶ conform with there name to the 8.3 DOS format (8 alphanumeric characters for name, 3 characters for extension, no space)
- ▶ Be stored close to the root directory (Root)

STRUCTURE

| Description | Type | Field size | Comment |
|-------------|------|------------|---|
| KANALNAME | Char | 128 | Variable name. The length can be limited using the MAX_LAENGE entry in project.ini . |
| KANAL_R | C | 128 | The original name of a variable that is to be replaced by the new name entered under "VARIABLENNAME" (field/column must be entered manually). The length can be limited using the MAX_LAENGE entry in project.ini . |
| KANAL_D | Log | 1 | The variable is deleted with the 1 entry (field/column has to be created by hand). |
| TAGNR | C | 128 | Identification. The length can be limited using the MAX_LAENGE entry in project.ini . |
| Unit | C | 11 | Technical unit |
| DATENART | C | 3 | Data type (e.g. bit, byte, word, ...) corresponds to the data type. |
| KANALTYP | C | 3 | Memory area in the PLC (e.g. marker area, data area, ...) corresponds to the driver object type. |
| HWKANAL | Num | 3 | Bus address |
| BAUSTEIN | N | 3 | Datablock address (only for variables from the data area of the PLC) |
| ADDRESS | N | 5 | Offset |

| | | | |
|------------|-------|----|--|
| BITADR | N | 2 | For bit variables: bit address For byte variables: 0=lower, 8=higher byte For string variables: Length of string (max. 63 characters) |
| ARRAYSIZE | N | 16 | Number of variables in the array for index variables ATTENTION: Only the first variable is fully available. All others are only available for VBA or the Recipe Group Manager |
| LES_SCHR | R | 1 | Write-Read-Authorization 0: Not allowed to set value. 1: Allowed to set value. |
| MIT_ZEIT | R | 1 | time stamp in zenon zenon (only if supported by the driver) |
| OBJEKT | N | 2 | Driver-specific ID number of the primitive object comprises TREIBER-OBJEKTYP and DATENTYP |
| SIGMIN | Float | 16 | Non-linearized signal - minimum (signal resolution) |
| SIGMAX | F | 16 | Non-linearized signal - maximum (signal resolution) |
| ANZMIN | F | 16 | Technical value - minimum (measuring range) |
| ANZMAX | F | 16 | Technical value - maximum (measuring range) |
| ANZKOMMA | N | 1 | Number of decimal places for the display of the values (measuring range) |
| UPDATERATE | F | 19 | Update rate for mathematics variables (in sec, one decimal possible) not used for all other variables |
| MENTIEFE | N | 7 | Only for compatibility reasons |
| HDRATE | F | 19 | HD update rate for historical values (in sec, one decimal possible) |
| HDTIEFE | N | 7 | HD entry depth for historical values (number) |
| NACHSORT | R | 1 | HD data as postsorted values |
| DRRATE | F | 19 | Updating to the output (for zenon DDE server, in [s], one decimal possible) |
| HYST_PLUS | F | 16 | Positive hysteresis, from measuring range |
| HYST_MINUS | F | 16 | Negative hysteresis, from measuring range |
| PRIOR | N | 16 | Priority of the variable |
| REAMATRIZE | C | 32 | Allocated reaction matrix |

| | | | |
|------------|---|-----|--|
| ERSATZWERT | F | 16 | Substitute value, from measuring range |
| SOLLMIN | F | 16 | Minimum for set value actions, from measuring range |
| SOLLMAX | F | 16 | Maximum for set value actions, from measuring range |
| VOMSTANDBY | R | 1 | Get value from standby server; the value of the variable is not requested from the server but from the Standby Server in redundant networks |
| RESOURCE | C | 128 | Resources label. Free string for export and display in lists. The length can be limited using the MAX_LAENGE entry in project.ini . |
| ADJWVBA | R | 1 | Non-linear value adaption: 0: Non-linear value adaption is used 1: Non-linear value adaption is not used |
| ADJZENON | C | 128 | Linked VBA macro for reading the variable value for non-linear value adjustment. |
| ADJWVBA | C | 128 | ed VBA macro for writing the variable value for non-linear value adjustment. |
| ZWREMA | N | 16 | Linked counter REMA. |
| MAXGRAD | N | 16 | Gradient overflow for counter REMA. |



Attention

When importing, the driver object type and data type must be amended to the target driver in the DBF file in order for variables to be imported.

LIMIT DEFINITION

Limit definition for limit values 1 to 4, and status 1 bis 4:

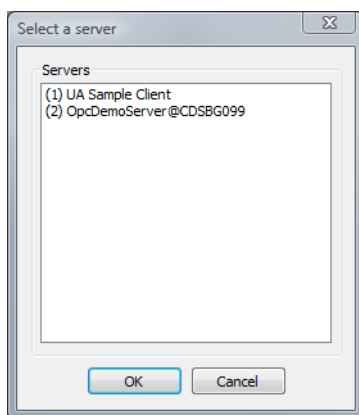
| Description | Type | Field size | Comment |
|-------------|------|------------|---|
| AKTIV1 | R | 1 | Limit value active (per limit value available) |
| GRENZWERT1 | F | 20 | hnical value or ID number of a linked variable for a dynamic limit (see VARIABLEx) (if VARIABLEx is 1 and here it is -1, the existing variable linkage is not overwritten) |
| SCHWWERT1 | F | 16 | Threshold value for limit |
| HYSTERESE1 | F | 14 | Is not used |
| BLINKEN1 | R | 1 | Set blink attribute |
| BTB1 | R | 1 | Logging in CEL |
| ALARM1 | R | 1 | Alarm |
| DRUCKEN1 | R | 1 | Printer output (for CEL or Alarm) |
| QUITTIER1 | R | 1 | Must be acknowledged |
| LOESCHE1 | R | 1 | Must be deleted |
| VARIABLE1 | R | 1 | Dyn. limit value linking the limit is defined by an absolute value (see field GRENZWERTx). |
| FUNC1 | R | 1 | Functions linking |
| ASK_FUNC1 | R | 1 | Execution via Alarm Message List |
| FUNC_NR1 | N | 10 | ID number of the linked function (if "-1" is entered here, the existing function is not overwritten during import) |
| A_GRUPPE1 | N | 10 | Alarm/event group |
| A_KLASSE1 | N | 10 | Alarm/event class |
| MIN_MAX1 | C | 3 | Minimum, Maximum |
| FARBE1 | N | 10 | Color as Windows coding |
| GRENZTXT1 | C | 66 | Limit value text |
| A_DELAY1 | N | 10 | Time delay |
| INVISIBLE1 | R | 1 | Invisible |

EXPRESSIONS IN THE COLUMN "COMMENT" REFER TO THE EXPRESSIONS USED IN THE DIALOG BOXES FOR THE DEFINITION OF VARIABLES. FOR MORE INFORMATION, SEE CHAPTER VARIABLE DEFINITION.

7.4.3 Online import

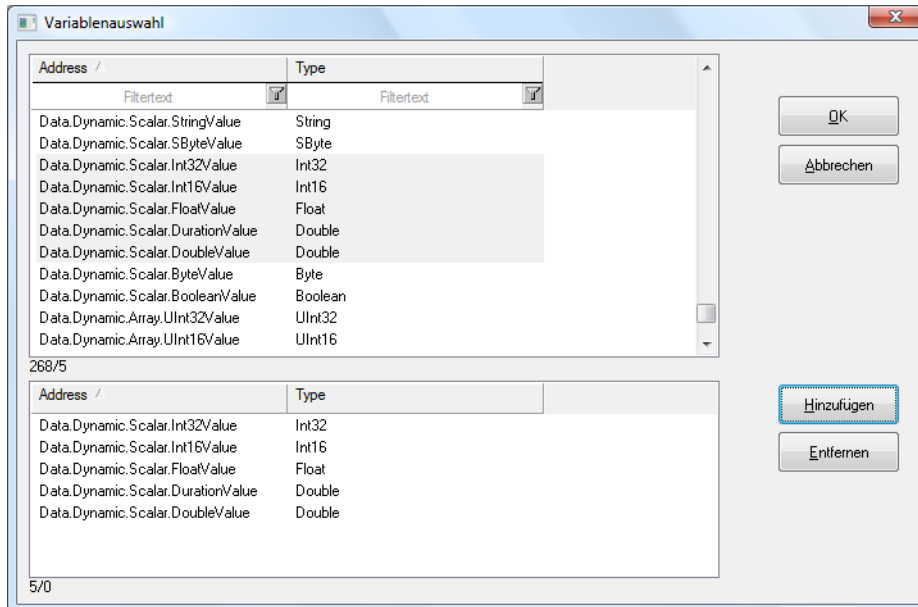
In order to create variables via the online import function:

1. select the driver in the detail view of the project manager
2. open the context menu with a right-click
3. click on **Import variables from driver**
4. now the dialog for the online import opens.



5. select the server from which you want to import the variables

6. after loading the available variables, they will be displayed



7. select the desired variables and add them to the zenon project via **Add** and **OK**



Information

When importing a large amount of variables, it is possible that not all variables have been imported correctly. In this case, you are informed by a corresponding message.

7.5 Driver variables

The driver kit implements a number of driver variables. These are divided into:

- ▶ Information
- ▶ Configuration
- ▶ Statistics and
- ▶ Error messages

The definitions of the variables defined in the driver kit are available in the import file `drvvar.dbf` (on the CD in the directory: `CD_Drive:/Predefined/Variables`) and can be imported from there.

Note: Variable names must be unique in zenon. If driver variables are to be imported from `drvvar.dbf` again, the variables that were imported beforehand must be renamed.



Information

Not every driver supports all driver variants.

For example:

- ▶ Variables for modem information are only supported by modem-compatible drivers
- ▶ Driver variables for the polling cycle only for pure polling drivers
- ▶ Connection-related information such as ErrorMessage only for drivers that only edit one connection at a time

INFORMATION

| Name from import | Type | Offset | Description |
|-----------------------------|------|----------|---------------------------------------|
| MainVersion | UINT | 0 | Main version number of the driver. |
| SubVersion | UINT | 1 | Sub version number of the driver. |
| BuildVersion | UINT | 29 | Build version number of the driver. |
| RTMajor | UINT | 49 | zenon main version number |
| RTMinor | UINT | 50 | zenon sub version number |
| RTSp | UINT | 51 | zenon service pack number |
| RTBuild | UINT | 52 | zenon build number |
| LineStateIdle | BOOL | 24.0 | TRUE, if the modem connection is idle |
| LineStateOffering | BOOL | 24.1 | TRUE, if a call is received |
| LineStateAccepted | BOOL | 24.2 | The call is accepted |
| LineStateDialtone | BOOL | 24.3 | Dialtone recognized |
| LineStateDialing | BOOL | 24.4 | Dialing active |
| LineStateRingBack | BOOL | 24.5 | While establishing the connection |
| LineStateBusy | BOOL | 24.6 | Target station is busy |
| LineStateSpecialInfo | BOOL | 24.7 | Special status information received |
| LineStateConnected | BOOL | 24.8 | Connection established |
| LineStateProceeding | BOOL | 24.9 | Dialing completed |
| LineStateOnHold | BOOL | 12:00 AM | Connection in hold |
| LineStateConferenced | BOOL | 12:00 AM | Connection in conference mode. |
| LineStateOnHoldPendConf | BOOL | 12:00 AM | Connection in hold for conference |
| LineStateOnHoldPendTransfer | BOOL | 24.13 | Connection in hold for transfer |
| LineStateDisconnected | BOOL | 24.14 | Connection terminated. |
| LineStateUnknow | BOOL | 24.15 | Connection status unknown |

| | | | |
|--------------|-------|----|---|
| ModemStatus | UDINT | 24 | Current modem status |
| TreiberStop | BOOL | 28 | Driver stopped For <code>driver stop</code> , the variable has the value <code>TRUE</code> and an <code>OFF</code> bit. After the driver has started, the variable has the value <code>FALSE</code> and no <code>OFF</code> bit. |
| SimulRTState | UDINT | 60 | Informs the status of Runtime for driver simulation. |

CONFIGURATION

| Name from import | Type | Offset | Description |
|------------------|--------|--------|---|
| ReconnectInRead | BOOL | 27 | If <code>TRUE</code> , the modem is automatically reconnected for reading |
| ApplyCom | BOOL | 36 | Apply changes in the settings of the serial interface. Writing to this variable immediately results in the method <code>SrvDrvVarApplyCom</code> being called (which currently has no further function). |
| ApplyModem | BOOL | 37 | Apply changes in the settings of the modem. Writing this variable immediately calls the method <code>SrvDrvVarApplyModem</code> . This closes the current connection and opens a new one according to the settings <code>PhoneNumberSet</code> and <code>ModemHwAdrSet</code> . |
| PhoneNumberSet | STRING | 38 | Telephone number, that should be used |
| ModemHwAdrSet | DINT | 39 | Hardware address for the telephone number |
| GlobalUpdate | UDINT | 3 | Update time in milliseconds (ms). |
| BGlobalUpdaten | BOOL | 4 | <code>TRUE</code> , if update time is global |
| TreiberSimul | BOOL | 5 | <code>TRUE</code> , if driver in sin simulation mode |
| TreiberProzab | BOOL | 6 | <code>TRUE</code> , if the variables update list should be |

| | | | |
|----------------|--------|----|---|
| | | | kept in the memory |
| ModemActive | BOOL | 7 | TRUE, if the modem is active for the driver |
| Device | STRING | 8 | Name of the serial interface or name of the modem |
| ComPort | UINT | 9 | Number of the serial interface. |
| Baud rate | UDINT | 10 | Baud rate of the serial interface. |
| Parity | SINT | 11 | Parity of the serial interface |
| ByteSize | USINT | 14 | Number of bits per character of the serial interface Value = 0 if the driver cannot establish any serial connection. |
| StopBit | USINT | 13 | Number of stop bits of the serial interface. |
| Autoconnect | BOOL | 16 | TRUE, if the modem connection should be established automatically for reading/writing |
| PhoneNumber | STRING | 17 | Current telephone number |
| ModemHwAdr | DINT | 21 | Hardware address of current telephone number |
| RxIdleTime | UINT | 18 | Modem is disconnected, if no data transfer occurs for this time in seconds (s) |
| WriteTimeout | UDINT | 19 | Maximum write duration for a modem connection in milliseconds (ms). |
| RingCountSet | UDINT | 20 | Number of ringing tones before a call is accepted |
| ReCallIdleTime | UINT | 53 | Waiting time between calls in seconds (s). |
| ConnectTimeout | UINT | 54 | Time in seconds (s) to establish a connection. |

STATISTICS

| Name from import | Type | Offset | Description |
|----------------------|-------|--------|---|
| MaxWriteTime | UDINT | 31 | The longest time in milliseconds (ms) that is required for writing. |
| MinWriteTime | UDINT | 32 | The shortest time in milliseconds (ms) that is required for writing. |
| MaxBlkReadTime | UDINT | 40 | Longest time in milliseconds (ms) that is required to read a data block. |
| MinBlkReadTime | UDINT | 41 | Shortest time in milliseconds (ms) that is required to read a data block. |
| WriteErrorCount | UDINT | 33 | Number of writing errors |
| ReadSucceedCount | UDINT | 35 | Number of successful reading attempts |
| MaxCycleTime | UDINT | 22 | Longest time in milliseconds (ms) required to read all requested data. |
| MinCycleTime | UDINT | 23 | Shortest time in milliseconds (ms) required to read all requested data. |
| WriteCount | UDINT | 26 | Number of writing attempts |
| ReadErrorCount | UDINT | 34 | Number of reading errors |
| MaxUpdateTimeNormal | UDINT | 56 | Time since the last update of the priority group Normal in milliseconds (ms). |
| MaxUpdateTimeHigher | UDINT | 57 | Time since the last update of the priority group Higher in milliseconds (ms). |
| MaxUpdateTimeHigh | UDINT | 58 | Time since the last update of the priority group High in milliseconds (ms). |
| MaxUpdateTimeHighest | UDINT | 59 | Time since the last update of the priority group Highest in milliseconds (ms). |
| PokeFinish | BOOL | 55 | Goes to 1 for a query, if all current pokes were executed |

ERROR MESSAGES

| Name from import | Type | Offset | Description |
|-------------------|--------|--------|---|
| ErrorTimeDW | UDINT | 2 | Time (in seconds since 1.1.1970), when the last error occurred. |
| ErrorTimeS | STRING | 2 | Time (in seconds since 1.1.1970), when the last error occurred. |
| RdErrPrimObj | UDINT | 42 | Number of the PrimObject, when the last reading error occurred. |
| RdErrStationsName | STRING | 43 | Name of the station, when the last reading error occurred. |
| RdErrBlockCount | UINT | 44 | Number of blocks to read when the last reading error occurred. |
| RdErrHwAdresse | DINT | 45 | Hardware address when the last reading error occurred. |
| RdErrDatablockNo | UDINT | 46 | Block number when the last reading error occurred. |
| RdErrMarkerNo | UDINT | 47 | Marker number when the last reading error occurred. |
| RdErrSize | UDINT | 48 | Block size when the last reading error occurred. |
| DrvError | USINT | 25 | Error message as number |
| DrvErrorMsg | STRING | 30 | Error message as text |
| ErrorFile | STRING | 15 | Name of error log file |

8. Driver-specific functions

The driver supports the following functions:

MAPPING SPECIAL STATUS

Mapping of NAN and NULL to the zenon status INVALID. If one of the statuses from the table is received, the status INVALID is set in zenon.

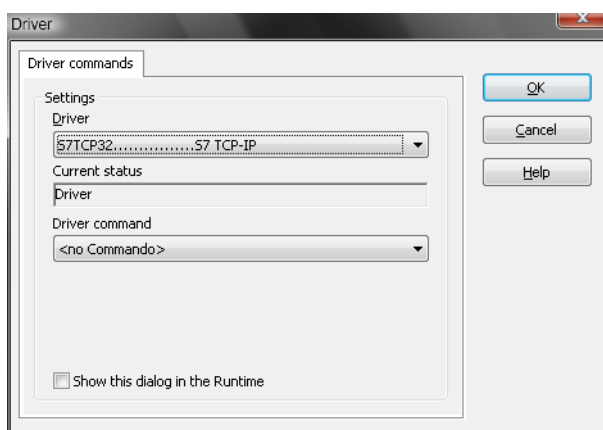
| OPCUA | Value | NT_870 | OV_870 |
|-------|-----------|--------|--------|
| NAN | 0 | 1 | 1 |
| NULL | 0 | 1 | 0 |
| +INF | +MAXFLOAT | 0 | 1 |
| -INF | -MAXFLOAT | 0 | 1 |

9. Driver commands

This chapter describes standard functions that are valid for most zenon drivers. Not all functions described here are available for every driver. For example, a driver that does not, according to the data sheet, support a modem connection also does not have any modem functions.

Driver commands are used to influence drivers using zenon; start and stop for example. The engineering is implemented with the help of function **Driver commands**. To do this:

- ▶ create a new function
- ▶ select *Variables -> Driver commands*
- ▶ The dialog for configuration is opened



| Parameters | Description |
|-------------------------------------|--|
| Drivers | Drop-down list with all drivers which are loaded in the project. |
| Current state | Fixed entry which has no function in the current version. |
| Driver commands | Drop-down list for the selection of the command. |
| ▶ Start driver (online mode) | Driver is reinitialized and started. |
| ▶ Stop driver (offline mode) | Driver is stopped. No new data is accepted. Note: If the driver is in offline mode, all variables that were created for this driver receive the status switched off (OFF; Bit 20). |
| ▶ Driver in simulation mode | Driver is set into simulation mode. The values of all variables of the driver are simulated by the driver. No values from the connected hardware (e.g. PLC, bus system, ...) are displayed. |
| ▶ Driver in hardware mode | Driver is set into hardware mode. For the variables of the driver the values from the connected hardware (e.g. PLC, bus system, ...) are displayed. |
| ▶ Driver-specific command | Enter driver-specific commands. Opens input field in order to enter a command. |
| ▶ Activate driver write set value | Write set value to a driver is allowed. |
| ▶ Deactivate driver write set value | Write set value to a driver is prohibited. |
| ▶ Establish connection with modem | Establish connection (for modem drivers) Opens the input fields for the hardware address and for the telephone number. |
| ▶ Disconnect from modem | Terminate connection (for modem drivers) |
| Show this dialog in the Runtime | The dialog is shown in Runtime so that changes can be made. |

DRIVER COMMANDS IN THE NETWORK

If the computer, on which the **driver command** function is executed, is part of the zenon network, additional actions are carried out. A special network command is sent from the computer to the project

server, which then executes the desired action on its driver. In addition, the Server sends the same driver command to the project standby. The standby also carries out the action on its driver.

This makes sure that Server and Standby are synchronized. This only works if the Server and the Standby both have a working and independent connection to the hardware.

10. Error analysis

Should there be communication problems, this chapter will assist you in finding out the error.

10.1 Analysis tool

All zenon modules such as Editor, Runtime, drivers, etc. write messages to a joint log file. To display them correctly and clearly, use the Diagnosis Viewer (main.chm::/12464.htm) program that was also installed with zenon. You can find it under *Start/All programs/zenon/Tools 7.11 -> Diagviewer*.

zenon driver log all errors in the log files. The default folder for the log files is subfolder `LOG` in directory `ProgramData`, example:

`C:\ProgramData\zenon\zenon7.11\LOG` for zenon Version 7.11. Log files are text files with a special structure.

Attention: With the default settings, a driver only logs error information. With the **Diagnosis Viewer** you can enhance the diagnosis level for most of the drivers to "Debug" and "Deep Debug". With this the driver also logs all other important tasks and events.

In the Diagnosis Viewer you can also:

- ▶ follow currently created entries live
- ▶ customize the logging settings
- ▶ change the folder in which the log files are saved

Hints:

1. In Windows CE even errors are not logged per default due to performance reasons.

2. The Diagnosis Viewer displays all entries in UTC (coordinated world time) and not in local time.
3. The Diagnosis Viewer does not display all columns of a log file per default. To display more columns activate property **Add all columns with entry** in the context menu of the column header.
4. If you only use **Error logging**, the problem description is in column **Error text**. For other diagnosis level the description is in column **General text**.
5. For communication problems many drivers also log error numbers which the PLC assigns to them. They are displayed in **Error text** and/or **Error code** and/or **Driver error parameter** (1 and 2). Hints on the meaning of error codes can be found in the driver documentation and the protocol/PLC description.
6. At the end of your test set back the diagnosis level from **Debug** or **Deep Debug**. At **Debug** and **Deep Debug** there are a great deal of data for logging which are saved to the hard drive and which can influence your system performance. They are still logged even after you close the **Diagnosis Viewer**.



Information

You can find further information on the Diagnosis Viewer in the Diagnose Viewer (main.chm::/12464.htm) chapter.

10.2 Check list

QUESTIONS FOR LOCATING ERRORS

- ▶ Is the PLC connected to the power supply?
- ▶ Are the participants available in the TCP/IP network?

- ▶ Can the PLC be reached via the **ping** command?
- ▶ Can the PLC be reached via **Telnet**?
- ▶ Are the PLC and the PC connected with the right cable?
- ▶ Did you configure the net address correctly, both in the driver dialog and in the address properties of the variables?
- ▶ Did you use the right object type for the variable?
- ▶ Does the offset addressing of the variable match the one in the PLC?
- ▶ Analysis with the **Diagnosis Viewer** (on page 47): Which messages are displayed?
- ▶ Can you communicate with another OPC UA client?