

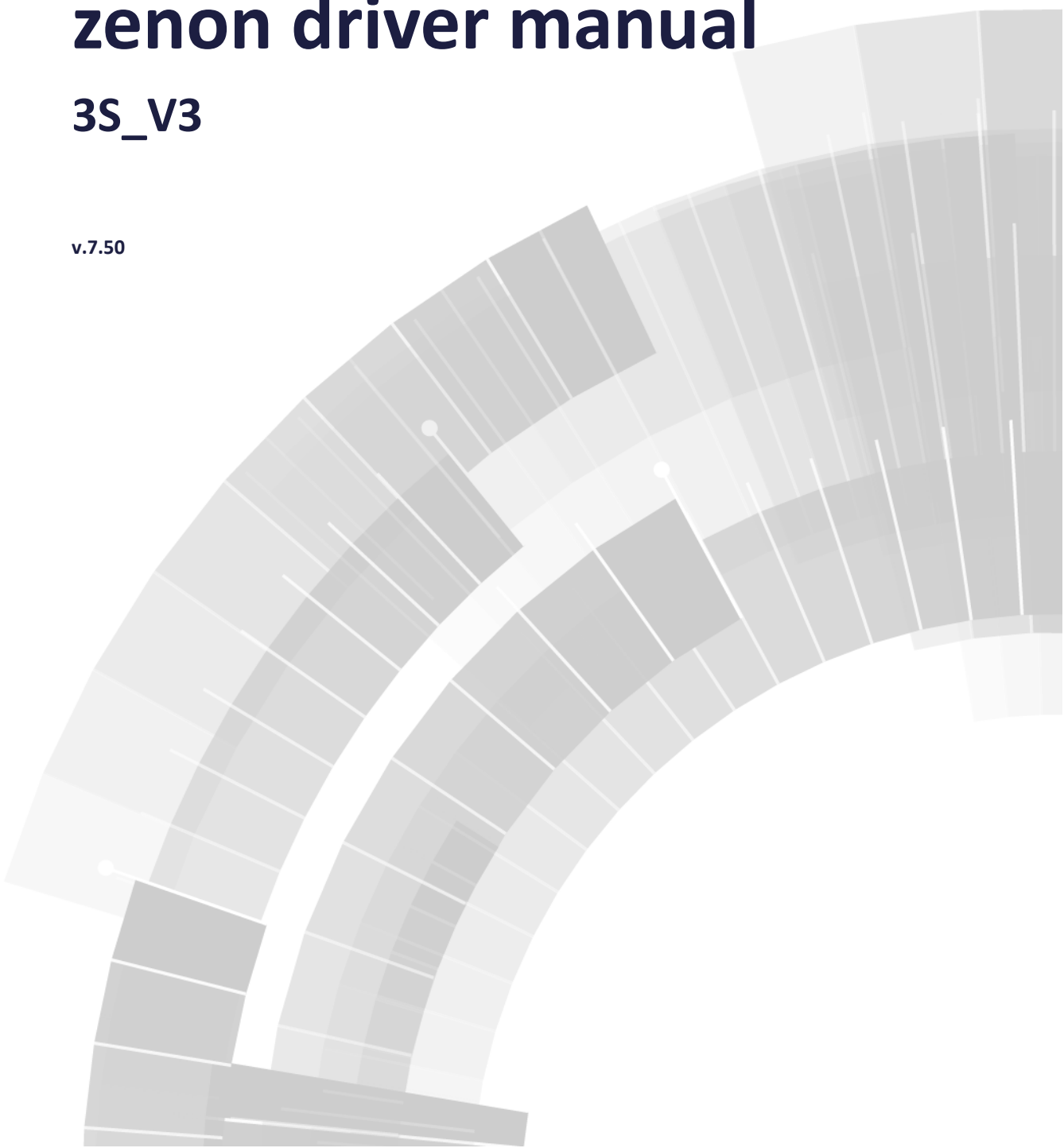


**COPADATA**  
do it your way

# zenon driver manual

## 3S\_V3

v.7.50





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# 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) (<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) (<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) (<mailto:sales@copadata.com>).

# 2. 3S\_V3

## GENERAL

The **3S\_V3** driver uses the PLC-Handler from CoDeSys to connect to the PLC. The PLC-Handler is an interface to controllers with software versions V2.3 and V3.



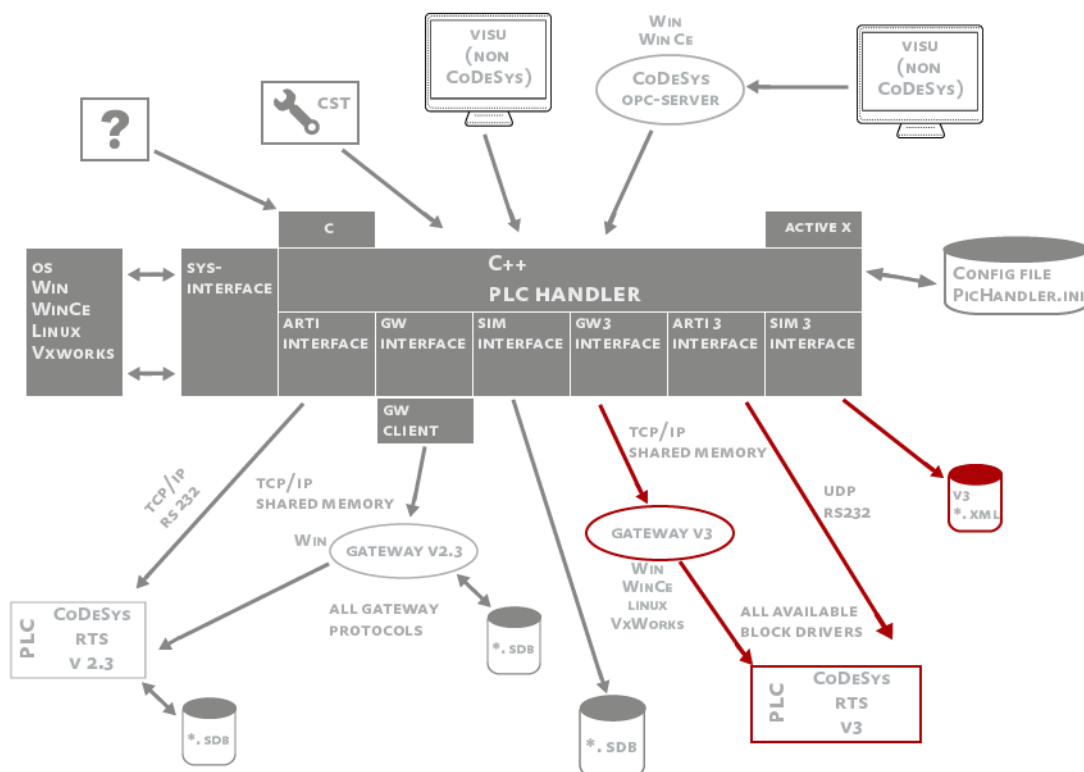
## Information

From zenon 7.50, the driver supports both CoDeSys software version 2.3 as well as version 3.

## PLC-HANDLER

Different versions of the PLC Handler are not compatible. The correct PLC handler for the respective driver version must always be used. PLC-Handlers of other versions must be replaced. For details see the **PC** (on page 10) chapter:

## CONNECTION



Version V3 and version V2.3 controllers are addressed by means of the **node address**, which is unique in the network that can be contacted.

A connection to the control can be established.

- ▶ using ARTI (Asynchronous RunTime Interface) via the local network card  
or
- ▶ a gateway on the local computer or a remote computer

The driver can address several controllers at the same time. In doing so, a separate PLC handler instance is created for each connection.

### SYMBOLIC ADDRESSING

The PLC-Handler only addresses variables in the controller using its symbolic name. Addressing using the offset of the variables is not possible. However, for complex variables (structures, arrays) the whole (binary) data block of the variable can be addressed using the **base name**. This is used by the driver for RDA (on page 53).

In zenon versions up to 7.00, variables are addressed using variable identification. From version 7.10 onwards, it is possible to select whether the identification or the **symbolic address** option is used.

In order for the PLC handler to find the variables via the symbolic name in the controller, you must select the variables used in the zenon project in the CoDeSys project configuration software using a symbol configuration object and transfer this to the controller. In doing so, a symbol file in XML format is created at the same time. This can be used for offline importing of variables.

Note: The connection is broken if there are no symbols in the controller.

## 3. 3S\_V3 - Data sheet

General:	
Driver file name	3S_V3.exe
Driver name	3S v3 driver for PLC Handler
PLC types	3S CoDeSys v3 based PLCs ; Schneider Electric PAC Drive LMC; V2 PLCs from Version: V2.3.9.33
PLC manufacturer	3S; Elau; Schneider; Bosch Rexroth;

<b>Driver supports:</b>	
Protocol	3S-Arti; 3S-Gateway;
Addressing: Address-based	--
Addressing: Name-based	X
Spontaneous communication	--
Polling communication	X
Online browsing	X
Offline browsing	X
Real-time capable	X
Blockwrite	--
Modem capable	--
Serial logging	--
RDA numerical	X
RDA String	--

<b>Requirements:</b>	
Hardware PC	--
Software PC	PLC Handler from 3S; The file 'PLCHandlerDll.dll' will be installed automatically with the setup.
Hardware PLC	--
Software PLC	--
Requires v-dll	X



Platforms:	
Operating systems	Windows CE 6.0, Embedded Compact 7; Windows 7, 8, 8.1, 10, Server 2008R2, Server 2012, Server 2012R2;
CE platforms	x86; ARM;

## 4. Driver history

Date	Build number	Change
21.06.13	7.11.0.7498	Created driver documentation
17.08.15	7.50.0.21651	Driver supports: <ul style="list-style-type: none"> <li>▶ Selection of the origin of the time stamp</li> <li>▶ Block arrays</li> <li>▶ Amendable prefix for imported variable names</li> <li>▶ Exception handling</li> </ul>
30.09.15	7.20.0.21830	Driver supports and requires PLC Handler 3.5.7.0.
10.1.2016	7.50.0.25589	Additional support of CoDeSys version 2.3.

### 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 form 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

#### ADDITIONAL SOFTWARE

##### PC

The driver needs the **PLCHandlerDll.dll**, which is produced by 3S and contains **PLCHandler-SDK**. The required version depends on the version of zenon used:

##### ZENON 7.50

From version 7.50, zenon supports the communication of both V3 and V2 connections.

The following rules are applicable for a connection to the PLC with version 2:

- ▶ If the connection is established using ARTI (peer-to-peer), no additional software is required.
- ▶ If the connection is established by means of a gateway, the following files must be present in the same directory in which the driver .exe file is also located:
  - GClient.dll
  - GDrvBase.dll
  - GHandle.dll
  - GHandleStdcall.dll
  - GSymbol.dll
  - GUtil.dll

**Note:** The directory can also be stated with the `PATH` environment variable.

- ▶ If the gateway is to be started automatically on the driver (with the driver at the latest), the following files must be in the same directory in which the client DLLs are located for a connection to V 2 (see above):
  - Gateway.exe
  - GatewayDDE.exe

- CommSym.dll
  - CommUsr.dll
- ▶ The version of the gateway software and the DLLs is 2.3.9.33 (or higher).

#### NOTE ON COMPATIBILITY

Communication to controllers with version 2 software is only possible from zenon 7.50. Note the following requirements for older versions:

FROM ZENON VERSION	Required PLC handler version	Notes
<b>7.00</b>	3.5.3.60	The <b>PLCHandlerDII.dll</b> must be present in the Windows folder.
<b>7.11</b>	3.5.4.0	The PLC Handler is installed in the Windows folder.
<b>7.20 Build 21830</b>	3.5.7.0	From zenon 7.20, the respective current version of the <b>PLCHandlerDII.dll</b> is installed automatically. The installation folder is now the same folder as that of the driver.



#### Information

*Ensure that PLC firmware and PLC-Handler have the same version number. Only this way can correct communication be guaranteed.*

*Note: You can find an overview of the versions used on the computer in the driver dialog in the Information tab.*

#### CE

No software needs to be installed for CE; **PLCHandler-SDK** has a fixed link to the driver.

Under Windows CE it is not possible to use several drivers of the same type.



#### Attention

CE is only supported up to version 7.20.

From version 7.50, Runtime files for 7.20 must be created.

## 5.2 PLC

### CONTROLS

The 3S\_V3 driver is to connect a PLC that uses 3S CoDeSys V3 or V2.3 software.

Examples: **3S CoDeSys**, **Control Win V3**, or **Schneider LMC PacDrive**.

The connection to the PLC is possible via

- ▶ The ARTI interface (`Asynchronous RunTime Interface`)
- ▶ A local or a remote gateway.



#### Information

From zenon 7.50, both CoDeSys software version 3 and version 2 are supported by the driver.

## 6. Configuration

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



#### Information

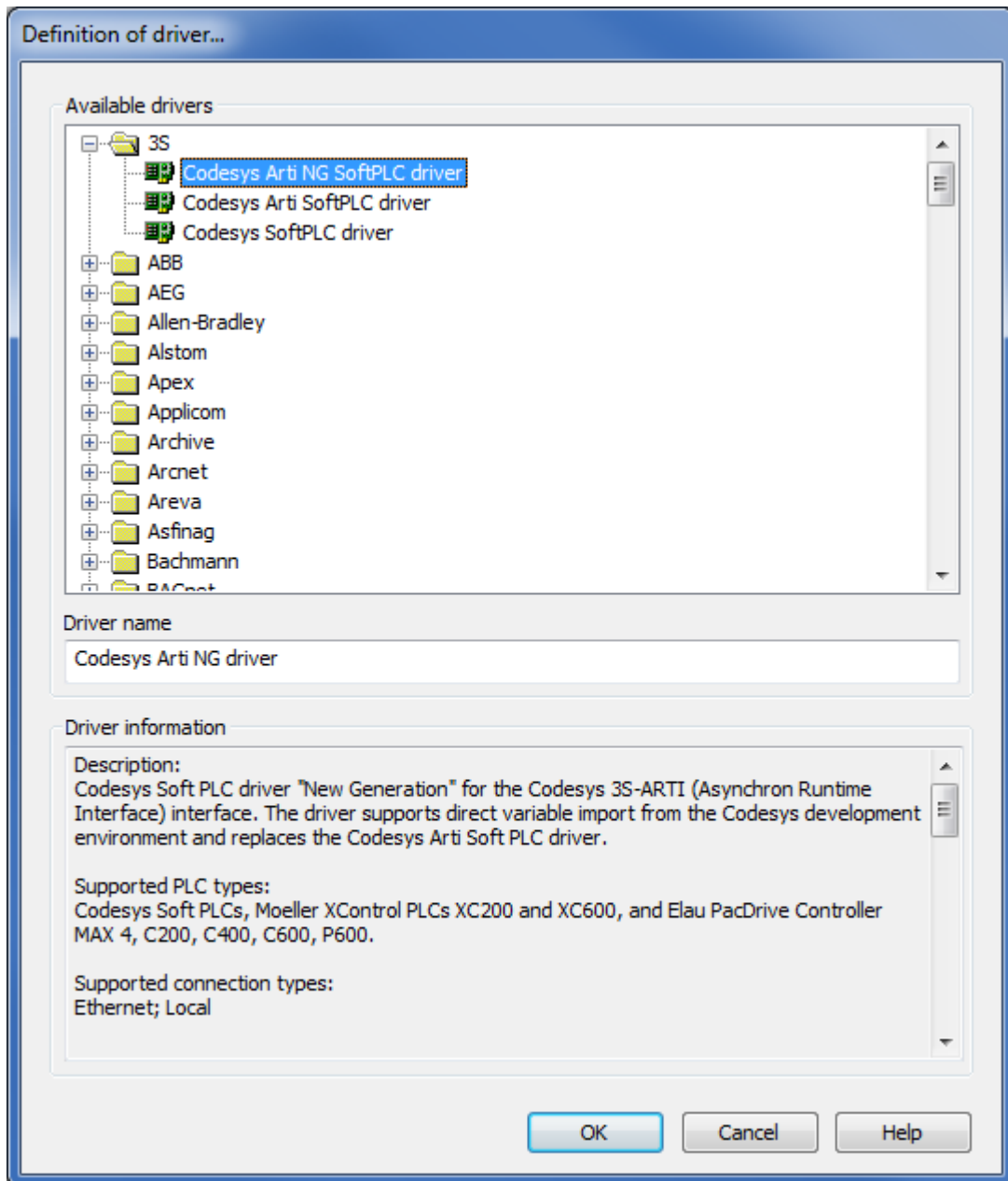
*Find out more about further settings for zenon variables in the chapter Variables (main.chm::/15247.htm) of the online manual.*

### 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.

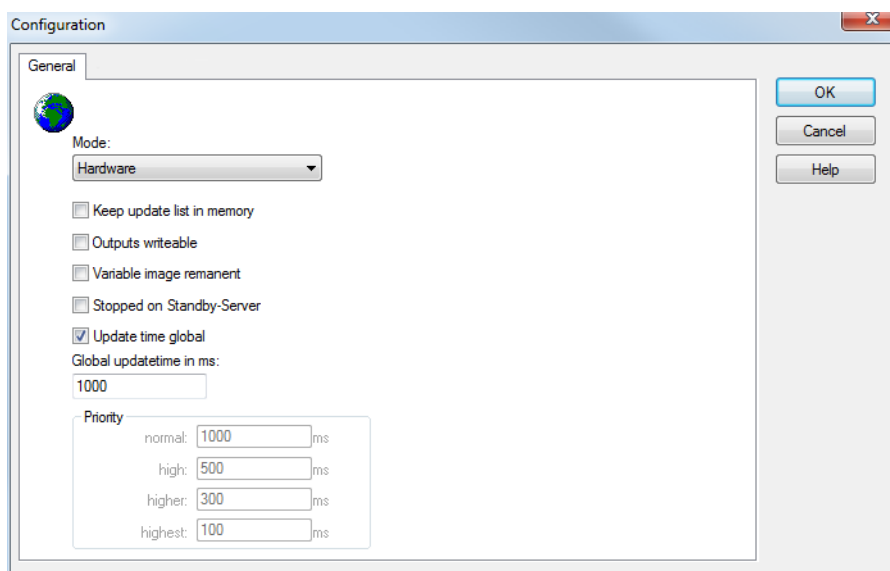


## 6.2 Settings in the driver dialog

You can change the following settings of the driver:

### 6.2.1 General

The configuration dialog is opened when a driver is created. In order to be able to open the dialog later for editing, double click on the driver in the list or click on the **Configuration** property.



Parameters	Description
<b>Mode</b>	<p>Allows to switch between hardware mode and simulation mode</p> <ul style="list-style-type: none"> <li>▶ Hardware: <ul style="list-style-type: none"> <li>A connection to the control is established.</li> </ul> </li> <li>▶ Simulation static <ul style="list-style-type: none"> <li>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 zenon Logic. 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.</li> </ul> </li> <li>▶ Simulation - counting <ul style="list-style-type: none"> <li>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.</li> </ul> </li> <li>▶ Simulation - programmed <ul style="list-style-type: none"> <li>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 zenon Logic Workbench and runs in a zenon Logic Runtime which is integrated in the driver. For details see chapter Driver simulation (main.chm::/25206.htm).</li> </ul> </li> </ul>
<b>Keep update list in the memory</b>	<p>Variables which were requested once are still requested from the control even if they are currently not needed. 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>
<b>Output can be written</b>	<p><i>Active</i>: Outputs can be written.</p> <p><i>Inactive</i>: Writing of outputs is prevented.</p> <p><i>Note</i>: Not available for every driver.</p>
<b>Variable image remanent</b>	<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"> <li>▶ one of the states S_MERKER_1(0) up to S_MERKER8(7), REVISION(9), AUS(20) or ERSATZWERT(27) is active</li> </ul> <p>The variable image is always saved if:</p> <ul style="list-style-type: none"> <li>▶ the variable is of the object type <b>Driver variable</b></li> <li>▶ the driver runs in simulation mode. (not programmed simulation)</li> </ul> <p>The following states are not restored at the start of the Runtime:</p> <ul style="list-style-type: none"> <li>▶ SELECT(8)</li> <li>▶ WR-ACK(40)</li> <li>▶ WR-SUC(41)</li> </ul> <p>The mode <b>Simulation - programmed</b> at the driver start is not a criterion in order to restore the remanent variable image.</p>
<p><b>Stop on Standby Server</b></p>	<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><b>Attention:</b> If this option is active, the gapless archiving is no longer guaranteed.</p> <p><i>Active:</i> 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 <b>switched off (statusverarbeitung.chm::/24150.htm)</b> but an empty value. This prevents that at the upgrade to the Server irrelevant values are created in the AML, CEL and Historian.</p> <p><b>Note:</b> Not available if the CE terminal serves as a data server. You can find further information in the zenon Operator manual in the CE terminal as a data server chapter.</p>
<p><b>Global Update time</b></p>	<p><i>Active:</i> The set <b>Global update time</b> in ms is used for all variables in the project. The priority set at the variables is not used.</p> <p><i>Inactive:</i> The set priorities are used for the individual variables.</p>
<p><b>Priority</b></p>	<p>The polling times for the individual priority classes are set here. All variables with the according priority are polled in the set time.</p> <p>The allocation to the variables takes place separately in the settings of the variable properties.</p> <p>The communication of the individual variables are graduated in respect of importance or necessary topicality using the priorities.</p>



	<p>Thus the communication load is distributed better.</p> <p>Attention: Priority classes are not supported by each driver For example, drivers that communicate spontaneously do not support it.</p>
--	--

#### CLOSE DIALOG

Parameters	Description
<b>OK</b>	Applies all changes in all tabs and closes the dialog.
<b>Cancel</b>	Discards all changes in all tabs and closes the dialog.
<b>Help</b>	Opens online help.

#### UPDATE TIME FOR CYCLICAL DRIVERS

The following applies for cyclical drivers:

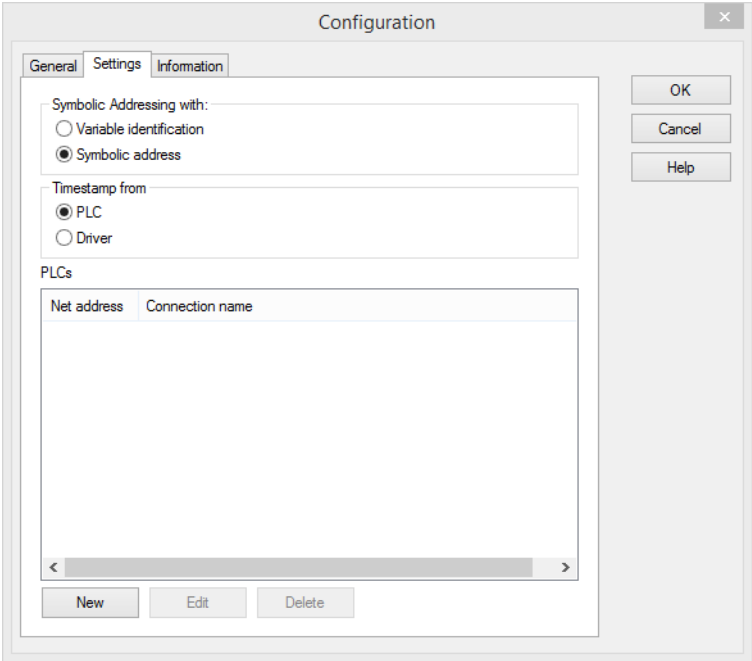
For **Set value**, **Advising** of variables and **Requests**, a read cycle is immediately triggered for all drivers - regardless of the set update time. This ensures that the value is immediately available for visualization after writing. Update times can therefore be shorter than pre-set for cyclical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

### 6.2.2 Settings

You configure the following in the settings tab:

- ▶ The type of symbolic addressing of the variables
- ▶ Origin of the time stamp

► Connection to the PLC



Parameters	Description
<b>Symbolic addressing via</b>	<p>Options field to select which source is used for the symbolic addressing of the variables:</p> <ul style="list-style-type: none"> <li>▶ <b>Variable identification</b> Symbolic addressing of variables is carried out using the variable identification.</li> <li>▶ <b>Symbolic addressing</b> Symbolic addressing of the variables is carried out using the symbolic address.</li> </ul> <p>Note: This selection can be made from zenon version 7.10 onwards. The variable identification is always used up to and including version 7.00. In this case, the options <b>variable identification</b> and <b>symbolic address</b> are not displayed.</p>
<b>Time stamp of</b>	<p>Options field to select how the time stamp of new variable values is determined:</p> <ul style="list-style-type: none"> <li>▶ <b>PLC:</b> Time stamp of the controller is used</li> <li>▶ <b>Driver:</b> Time stamp of the driver is used</li> </ul>

## CONTROLS

The connections are configured by clicking on the **New** button in the dialog to configure a connection (on page 21). Existing connection configurations can be amended by selecting them and clicking on the **Edit** button.

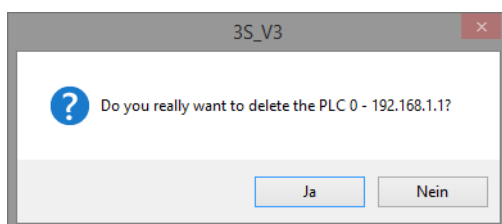
Parameters	Description
<b>controls</b>	<p>List of configured connections.</p> <ul style="list-style-type: none"> <li>▶ <b>Net address:</b> Net address of the connection, as configured for the connection. The network address must be unique.</li> <li>▶ <b>Connection name:</b> Name of the connection, as configured for the connection. This connection name corresponds to the configured node address (on page 21) in the dialog (on page 21) to configure a connection.</li> </ul> <p>The width of the columns in the list can be amended by holding down the mouse button and clicking on the column edge.</p>
<b>New</b>	Opens the dialog (on page 21) for configuring a connection.
<b>Edit</b>	Opens the dialog (on page 21) for the selected connection to configure a connection.
<b>Delete</b>	Deletes the selected connection after a confirmation message.

#### CLOSE DIALOG

Parameters	Description
<b>OK</b>	Applies all changes in all tabs and closes the dialog.
<b>Cancel</b>	Discards all changes in all tabs and closes the dialog.
<b>Help</b>	Opens online help.

#### CONFIRMATION REQUEST WHEN DELETING A CONNECTION

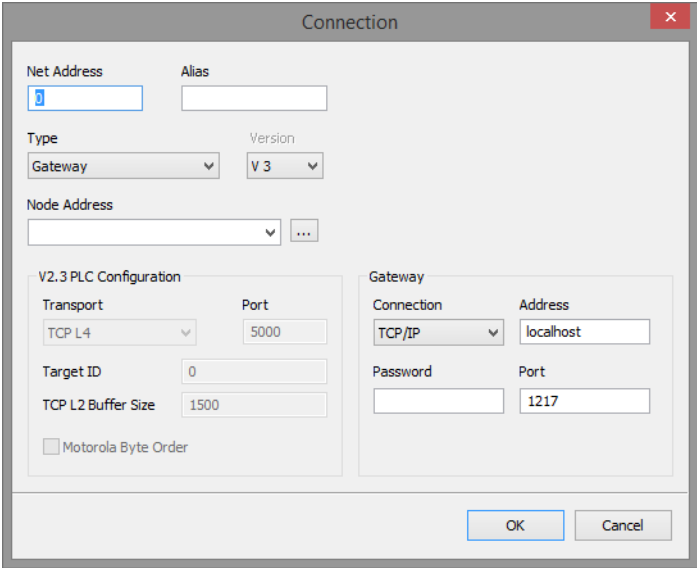
If a controller is selected for deletion, a request for confirmation is shown before deletion.



Parameters	Description
<b>Yes</b>	The connection is removed from the list of configured connections ( <b>controllers</b> ).
<b>No</b>	The connection is not deleted and remains in the list of configured connections. The dialog is closed.

### Connection

Configuration of the connection to a controller.



Parameters	Description
<b>Net address</b>	<p>Entry of the net address. The net address must be unique and must not be used twice. If a net address has already been issued, this is shown by a notice dialog.</p> <p>The entry is checked after clicking on the button <b>OK</b>. In case of failure, a warning dialog pops up.</p> <p>Attention: If a numerical figure outside the value range is entered, the net address is configured with the value -1.</p> <p>Default: The lowest net address that has not yet been issued is preset as a default. This net address corresponds to the zenon <b>Net address</b> property.</p>
<b>Alias</b>	<p>An alias can be entered for each connection. This serves as a prefix for the names of the variables that are imported from the driver.</p> <p>If this alias is empty, the node address is used as a prefix.</p> <p>Maximum length: 8 characters</p> <p>Note: Entry of more than 8 characters is not possible.</p>
<b>Connection type</b>	<p>Selection of the connection type from drop-down list:</p> <ul style="list-style-type: none"> <li>▶ Gateway: The communication to the PLC is by means of a gateway to the local or a remote computer You can find further configuration possibilities for the gateway connection type in the <b>Gateway</b> configuration group.</li> <li>▶ ARTI: Direct communication to the PLC by means of the local network card (peer-to-peer connection)</li> </ul> <p>Default: Gateway</p>
<b>Version</b>	<p>Selection of the version to be used from a drop-down list:</p> <ul style="list-style-type: none"> <li>▶ V3</li> <li>▶ V2.3 You can find further configuration possibilities for the use of V2.3 in the <b>V2.3 PLC configuration</b> configuration group.</li> </ul> <p>Default: V3</p>
<b>Node address</b>	<p>Node address or node name of the controller.</p> <p>Entry of node address or node name in the field or select from a drop-down list. Clicking on the ... button opens the dialog (on page 26) to select a PLC.</p> <p>Attention: This search for a controller is not available for the V2.3 communication. The search through the network is not possible with V2.3.</p> <p>When opened, a search for controllers in the network that can be contacted</p>

using the selected connection type is carried out. If the search for a controller is not possible, because the project computer and controller are in different networks, the address must be entered manually.

#### Node address and node name

- ▶ The node address can be different for different connection types. However it is always unique for the selected connection type.  
Note: A controller may get a new node address after a restart, because the original address is issued.
- ▶ The node name is not unique There can be several controllers on one device for example. These can then only be identified via the node address.

### V2.3 PLC CONFIGURATION

Configurations for communication with the 3S V3 driver to a PLC with V 2.3 software.

If **Version V3** is selected in the property, the properties of the V2.3 PLC configuration are grayed out.

Parameters	Description
<b>Transport</b>	<p>Drop-down list for the selection of the communication protocol.</p> <ul style="list-style-type: none"> <li>▶ TCP L4</li> <li>▶ TCP L2 Route</li> <li>▶ TCP L2</li> <li>▶ TCP L2ABB</li> </ul> <p><b>Note:</b> Only supports ABB controllers.</p> <p>Default: TCP L4</p>
<b>Port</b>	<p>Communication port number.</p> <p>Default: 5000</p> <p>The entry is checked after clicking on the button <b>OK</b>. In case of failure, a warning dialog pops up.</p>
<b>Target ID</b>	<p>Unique ID of the target device.</p> <p>Default: 0</p> <p>The entry is checked after clicking on the button <b>OK</b>. In case of failure, a warning dialog pops up.</p>
<b>TCP L2 Buffer Size</b>	<p>Buffer size of the TCP L2 protocol.</p> <p>Is only used for the TCP L2 communication protocols. This property has no effect on TCP L4.</p> <p>Default: 1500</p> <p>The entry is checked after clicking on the button <b>OK</b>. In case of failure, a warning dialog pops up.</p>
<b>Motorola Byte Order</b>	<p>Byte sequence for the receiving or sending of data</p> <ul style="list-style-type: none"> <li>▶ Activated: Data is processed in Big-Endian (Motorola) format.</li> <li>▶ Not activated: Data is processed in Little-Endian (Intel) format.</li> </ul>

## GATEWAY

Configuration of the connection to the Gateway.

If the **ARTI connection type** property has been selected, the properties of the gateway configuration have been grayed out.



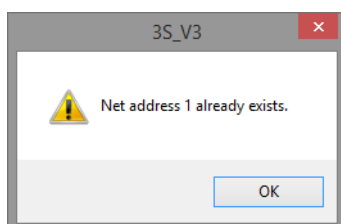
Parameters	Description
<b>Connection</b>	<p>Selection of the connection type from the PLC handler to the gateway via a drop-down list:</p> <ul style="list-style-type: none"> <li>▶ TCP/IP: TCP/IP connection</li> <li>▶ Shared Memory: Use of the shared memory on the local computer</li> </ul> <p>Default: TCP/IP</p>
<b>Address</b>	<p>Input field for the address of the gateway.</p> <p>The address can be configured as both numerical (192.168.1.1) and alphanumerical (e.g.: localhost).</p> <p>A check to see if the input is valid is not carried out.</p> <p>Note: Only available if TCP/IP is configured as a <b>connection</b>.</p>
<b>Password</b>	<p>Password of the gateway (optional).</p> <p>Note: Only available if TCP/IP is configured as a <b>connection</b>.</p>
<b>Port</b>	<p>Port of the gateway.</p> <p>Note: Only available if TCP/IP is configured as a <b>connection</b>.</p> <p>Default: 1217</p>

#### CLOSE DIALOG

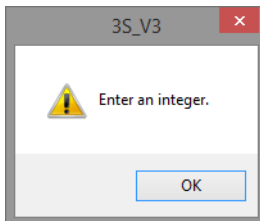
Parameters	Description
<b>OK</b>	Applies settings and closes the dialog.
<b>Cancel</b>	Discards all changes and closes the dialog.

#### WARNING DIALOG IN THE EVENT OF INCORRECT INPUT

Net address already present:

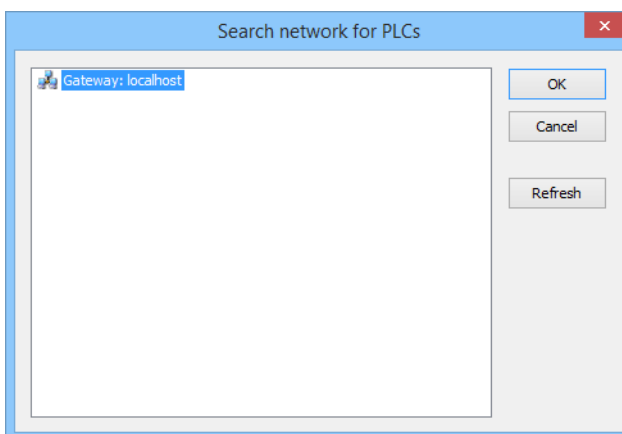


If an invalid entry is projected (such as letters), it will also be shown in a warning dialog.



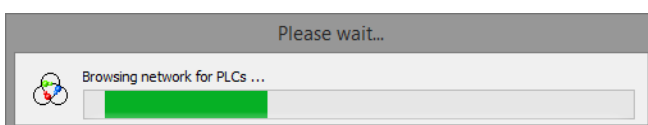
## Search for controller in the network

Clicking on the **Node address** button opens the dialog to select a controller. A search for controllers is carried out on opening. Controllers that have been found are offered for selection.



Parameters	Description
<b>List of controllers</b>	Lists all controllers that have been found. With a connection via gateway, the address configured in the <b>connection</b> is shown as a main node.
<b>OK</b>	Accepts the selected controller and closes the dialog.
<b>Cancel</b>	Discards selection and closes the dialog.
<b>Refresh</b>	Searches for controllers again.

## SEARCHING THE NETWORK

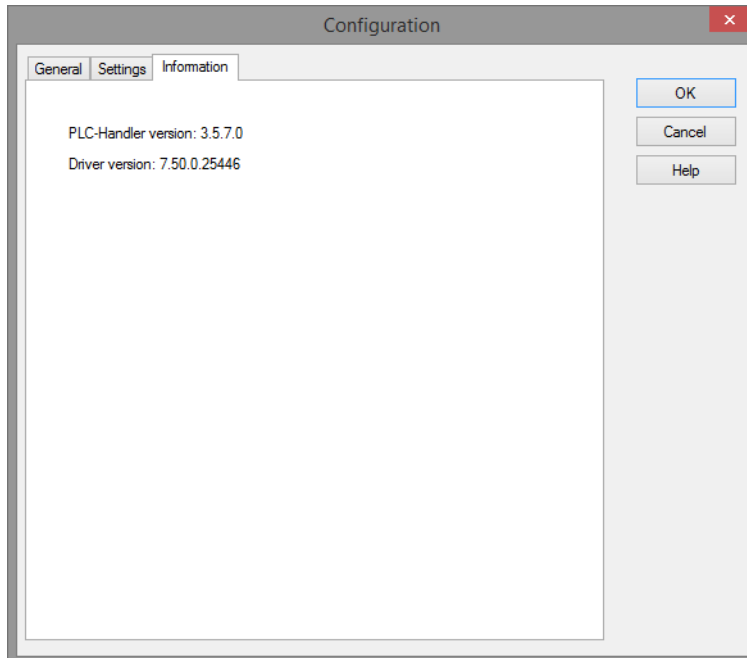


The searching of a network can - depending on the design and size of network - take some time. A dialog with a progress bar is visualized during this time.

### 6.2.3 Information

Information on the versions of:

- ▶ PLC-Handler
- ▶ Drivers



## 7. Creating variables

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

### 7.1 Creating variables in the Editor

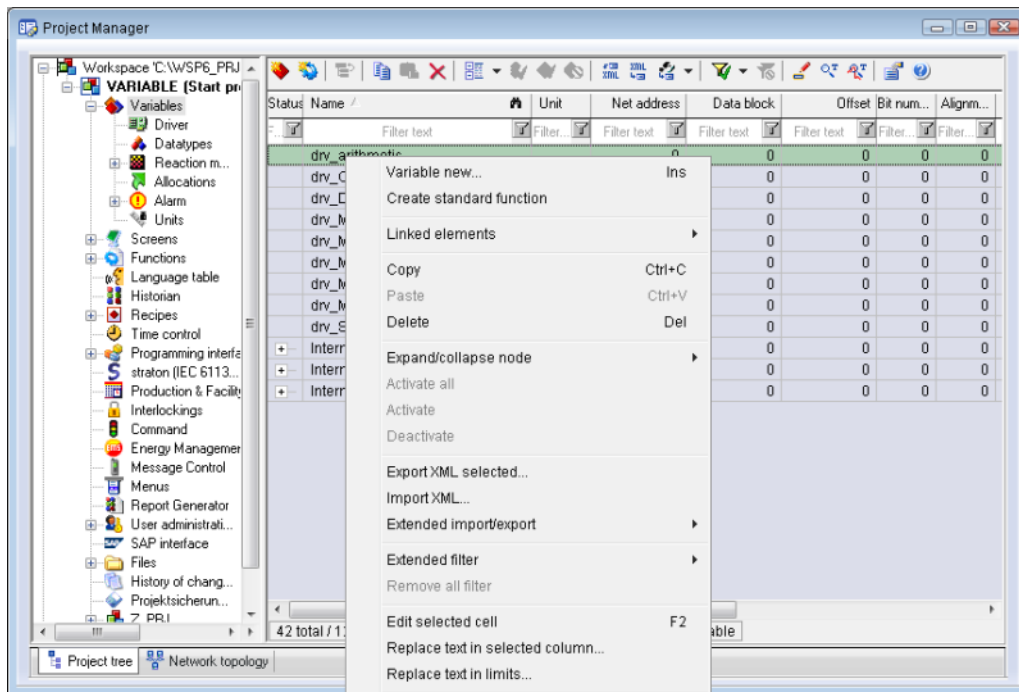
Variables can be created:

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

## VARIABLE DIALOG

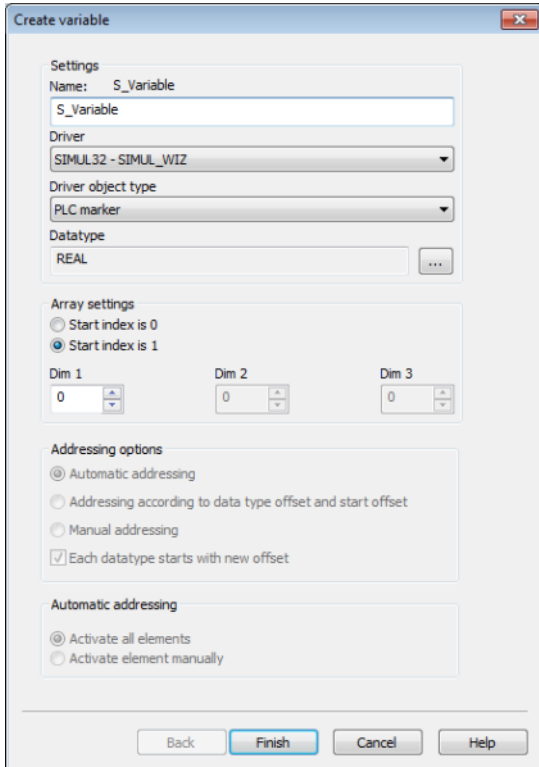
To create a new variable, regardless of which type:

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



The screenshot shows the 'Create variable' dialog box with the following settings:

- Settings**
  - Name: S\_Variable
  - Driver: SIMUL32 - SIMUL\_WIZ
  - Driver object type: PLC marker
  - Datatype: REAL
- Array settings**
  - Start index is 0
  - Start index is 1
  - Dim 1: 0
  - Dim 2: 0
  - Dim 3: 0
- Addressing options**
  - Automatic addressing
  - Addressing according to data type offset and start offset
  - Manual addressing
  - Each datatype starts with new offset
- Automatic addressing**
  - Activate all elements
  - Activate element manually

Buttons at the bottom: Back, Finish, Cancel, Help.

Property	Description
<b>Name</b>	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.  Maximum length: 128 character  Attention: The characters # and @ are not permitted in variable names. If non-permitted characters are used, creation of variables cannot be completed and the <b>Finish</b> button remains inactive. Note: For some drivers, the addressing is possible over the property <b>Symbolic address</b> , as well.
<b>Drivers</b>	Select the desired driver from the drop-down list.  Note: If no driver has been opened in the project, the driver for internal variables ( <b>Intern.exe (Main.chm::/Intern.chm::/Intern.htm)</b> ) is automatically loaded.
<b>Driver object type (cti.chm::/28685.htm)</b>	Select the appropriate driver object type from the drop-down list.
<b>Data type</b>	Select the desired data type. Click on the ... button to open the selection dialog.
<b>Array settings</b>	Expanded settings for array variables. You can find details in the Arrays chapter.
<b>Addressing options</b>	Expanded settings for arrays and structure variables. You can find details in the respective section.
<b>Automatic element activation</b>	Expanded settings for arrays and structure variables. You can find details in the respective section.

## SYMBOLIC ADDRESS

The **Symbolic address** property can be used for addressing as an alternative to the **Name** or **Identification** of the variables. Selection is made in the driver dialog; configuration is carried out in the variable property. When importing variables of supported drivers, the property is entered automatically.

Maximum length: 1024 characters.

## 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

Group/Property	Description
<b>General</b>	Standard Configuration
<b>Name</b>	Freely definable name. Attention: For every zenon project the name must be unambiguous.
<b>Identification</b>	<ul style="list-style-type: none"> <li>▶ Up to zenon Version 7.00: <b>Symbolic address</b></li> <li>▶ From version 7.10 on: Either the <b>symbolic address</b> or a freely-selectable identification, for example for a resource label, comments...</li> </ul>
<b>Addressing</b>	Configuration of the addressing.
<b>Net address</b>	Bus address or net address of the variable.  This address refers to the bus address in the connection configuration of the driver. This defines the PLC, on which the variable resides.
<b>Data block</b>	not used
<b>Offset</b>	not used
<b>Alignment</b>	not used
<b>Bit number</b>	not used
<b>String length</b>	Only available for String variables: Maximum number of characters that the variable can take.
<b>Symbolic address</b>	From version 7.10 on: Option to choose symbolic address.
<b>Driver connection/Driver Object Type</b>	Object type of the variables. Depending on the driver used, is selected when the variable is created and can be changed here.
<b>Driver connection/Data Type</b>	Data type of the variable. Is selected during the creation of the variable; the type can be changed here.  Attention: If you change the data type later, all other properties of the variable must be checked and adjusted, if necessary.
<b>Driver connection/Priority</b>	Setting the priority class. The variable of the priority class is thus assigned as it was configured in the driver dialog in the <b>General</b> tab. The priority classes are only used if the <b>global update time</b> is deactivated.  If the <b>global update time</b> option is activated and the priority classes are used, there is an error entry in the log file of the system. The driver uses the highest possible priority.

### BLOCK ARRAYS

Block arrays can be read, written and imported. The symbol name without indexes is used. The # character is not permitted.

Example: **MAIN.MyArray**.

The number of indexes must correspond to that in the PLC.

Example: **For MyArray: ARRAY [0..99] OF INT;**

Note: In the variable properties of zenon, the **Block array size** property in the **Additional settings** group must be set to the value 100.



### Attention

*Note: In zenon, counting is started with 0, but with 1 in the PLC.*

## 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
<b>Alarm Event</b>	64	X	X	INT	Used for Exception Handling (on page 53)
<b>Alarm Variable</b>	65	X	--	BOOL, DINT, STRING, UDINT	Used for Exception Handling (on page 53)
<b>PLC marker</b>	8	X	X	BOOL, USINT, SINT, BYTE, UINT, WORD, INT, UDINT, DWORD, DINT, ULINT, LINT, LWORD, REAL, LREAL, STRING, WSTRING, DT, TOD, DATE, TIME	
<b>Status Feedback</b>	66	X	--	DINT	Used for Exception Handling (on page 53)
<b>Driver variable</b>	35	X	X	BOOL, SINT, USINT, INT, UINT, DINT, UDINT, REAL, STRING	Variable for the static analysis of the communication; is transferred between driver and Runtime (not to the PLC).  <b>Note:</b> The addressing and the behavior is the same for most zenon drivers.  Find out more in the chapter about the Driver variables (on page 46)

### 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
BIT, BOOL	BOOL	8
USINT	USINT	9
BYTE	BYTE	22
SINT	SINT	10
WORD	WORD	23
UINT, UINT16	UINT	2
INT, INT16, ENUM	INT	1
UDINT	UDINT	4
DINT	DINT	3
ULINT	ULINT	27
DWORD	DWORD	24
LINT	LINT	26
REAL	REAL	5
LREAL	LREAL	6
STRING	STRING	12
WSTRING	WSTRING	21
DATE	DATE	18
TIME	TIME	17
DT, DATE_AND_TIME	DT	20
TOD, TIME_OF_DAY	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 their 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

Identification	Type	Field size	Comment
<b>KANALNAME</b>	Char	128	Variable name.  The length can be limited using the MAX_LAENGE entry in <b>project.ini</b> .
<b>KANAL_R</b>	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 <b>project.ini</b> .
<b>KANAL_D</b>	Log	1	The variable is deleted with the 1 entry (field/column has to be created by hand).
<b>TAGNR</b>	C	128	Identification.  The length can be limited using the MAX_LAENGE entry in <b>project.ini</b> .
<b>EINHEIT</b>	C	11	Technical unit
<b>DATENART</b>	C	3	Data type (e.g. bit, byte, word, ...) corresponds to the data type.
<b>KANALTYP</b>	C	3	Memory area in the PLC (e.g. marker area, data area, ...) corresponds to the driver object type.
<b>HWKANAL</b>	Num	3	Bus address
<b>BAUSTEIN</b>	N	3	Datablock address (only for variables from the data area of the PLC)
<b>ADRESSE</b>	N	5	Offset
<b>BITADR</b>	N	2	For bit variables: bit address For byte variables: 0=lower, 8=higher byte For string variables: Length of string (max. 63 characters)
<b>ARRAYSIZE</b>	N	16	Number of variables in the array for index variables <b>ATTENTION:</b> Only the first variable is fully available. All others are only available for VBA or the Recipegroup Manager

<b>LES_SCHR</b>	L	1	Write-Read-Authorization 0: Not allowed to set value. 1: Allowed to set value.
<b>MIT_ZEIT</b>	L	1	time stamp in zenon (only if supported by the driver)
<b>OBJEKT</b>	N	2	Driver-specific ID number of the primitive object comprises TREIBER-OBJEKTYP and DATENTYP
<b>SIGMIN</b>	Float	16	Non-linearized signal - minimum (signal resolution)
<b>SIGMAX</b>	F	16	Non-linearized signal - maximum (signal resolution)
<b>ANZMIN</b>	F	16	Technical value - minimum (measuring range)
<b>ANZMAX</b>	F	16	Technical value - maximum (measuring range)
<b>ANZKOMMA</b>	N	1	Number of decimal places for the display of the values (measuring range)
<b>UPDATERATE</b>	F	19	Update rate for mathematics variables (in sec, one decimal possible) not used for all other variables
<b>MEMTIEFE</b>	N	7	Only for compatibility reasons
<b>HDRATE</b>	F	19	HD update rate for historical values (in sec, one decimal possible)
<b>HDTIEFE</b>	N	7	HD entry depth for historical values (number)
<b>NACHSORT</b>	L	1	HD data as postsorted values
<b>DRRATE</b>	F	19	Updating to the output (for zenon DDE server, in [s], one decimal possible)
<b>HYST_PLUS</b>	F	16	Positive hysteresis, from measuring range
<b>HYST_MINUS</b>	F	16	Negative hysteresis, from measuring range
<b>PRIOR</b>	N	16	Priority of the variable
<b>REAMATRIZE</b>	C	32	Allocated reaction matrix
<b>ERSATZWERT</b>	F	16	Substitute value, from measuring range
<b>SOLLMIN</b>	F	16	Minimum for set value actions, from measuring range
<b>SOLLMAX</b>	F	16	Maximum for set value actions, from measuring range
<b>VOMSTANDBY</b>	L	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
<b>RESOURCE</b>	C	128	Resources label. Free string for export and display in lists.  The length can be limited using the MAX_LAENGE entry in <b>project.ini</b> .
<b>ADJWVBA</b>	L	1	Non-linear value adaption: 0: Non-linear value adaption is used 1: Non-linear value adaption is not used

<b>ADJZENON</b>	C	128	Linked VBA macro for reading the variable value for non-linear value adjustment.
<b>ADJWVBA</b>	C	128	ed VBA macro for writing the variable value for non-linear value adjustment.
<b>ZWREMA</b>	N	16	Linked counter REMA.
<b>MAXGRAD</b>	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 VALUE DEFINITION

Limit definition for limit values 1 to 4, or status 1 to 4:

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

The import of variables from symbolic variable names can be selected as either online from the controller or offline via a symbol file.

#### REQUIREMENTS FOR THE IMPORT

In order for variable import to work, the variables used in the zenon project must be selected in the **CoDeSys** project configuration software using a symbol configuration object and transferred to the controller. During this process, a symbol file is created in XML format at the same time, which can be used for offline variable import.

Depending on the settings for whether the **VariableIdentification** or the **Symbolic address** is to be used for addressing, the **symbolic name** is entered in the corresponding property.

#### VARIABLE NAME

The imported **symbolic name** with a prefix is entered as a variable name.

This prefix is:

- ▶ An alias of the configured connection
- ▶ The node address of the configured connection if no alias has been configured.

**Note:** You create this configuration in the driver dialog to create a new connection (on page 21).

It is thus guaranteed that the variable name also remains unique if there are the same symbol names in different controllers. The variable name can therefore not be used for symbolic addressing.

#### Importing variables with the wizard

To import variables from the PLC directly:

1. select **Import variables from driver** from the context menu of the driver  
The import wizard is opened.
2. In the dialog, select the import source:
  - PLC:  
The variables are imported from the PLC directly.
  - XML symbol file  
The variables are imported from an XML file.
3. click on **Next**.

4. Select the controller and, for offline import, the XML file.  
The list of controllers corresponds to the configuration of the driver configuration (as configured in connection (on page 21)).
5. click on **Next**.
6. configure the filter settings.  
You can find further information on this in the description of the filter dialog.
7. Click on **Finish**.  
The selection list is displayed
8. Select the variables to be imported.
9. Click on **OK**.

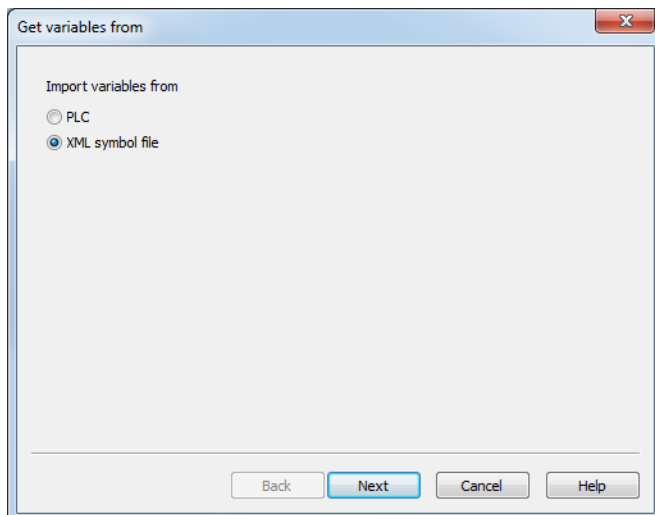
The variables are imported If an error occurs, a corresponding message is displayed.

## Online- and Offline-Import

You select the desired options during the import process with the import wizard.

### SELECTING THE IMPORT SOURCE

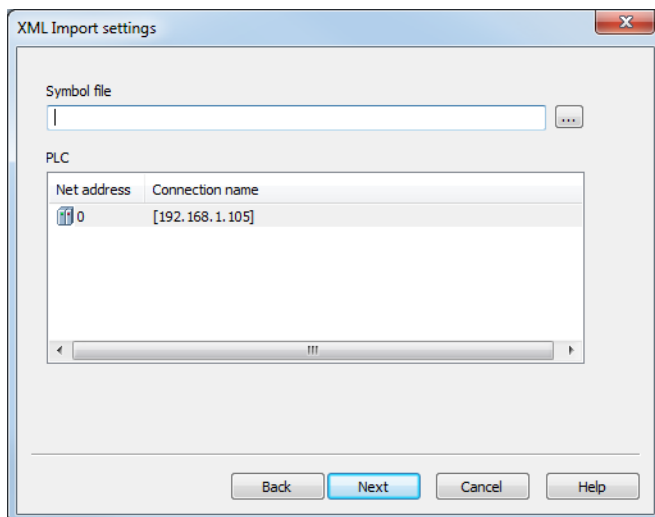
You select the import source for the variable import in this dialog.



Parameters	Description
<b>Import variables from</b>	Option field to select the import source: <ul style="list-style-type: none"> <li>▶ PLC: Variables are always imported from a controller.</li> <li>▶ XML symbol file: Variables are imported from an XML file created with the CoDeSys software.</li> </ul>
<b>Next</b>	Accepts setting and switches to the next window.
<b>Cancel</b>	Cancels the import. No variables are imported.
<b>Help</b>	Opens online help.

#### SOURCE OF XML FILE: SELECTION OF THE XML FILE AND THE CONTROLLER

In this dialog, you select the source of the variables to be imported. The file is also given when importing from an XML symbol file.

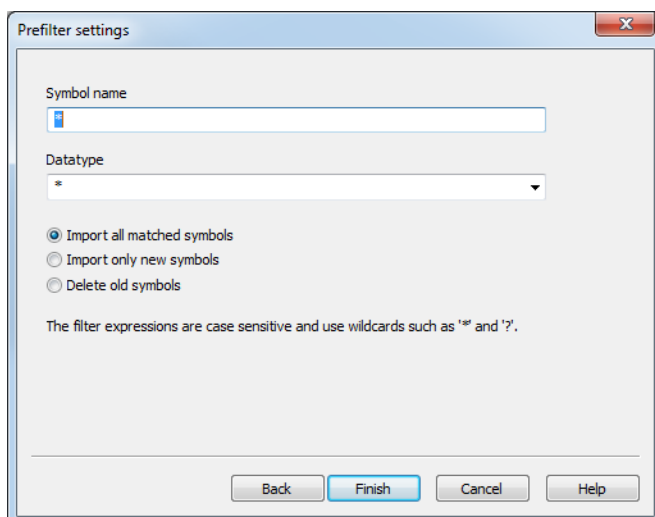


Parameters	Description
<b>Symbol file</b>	Selection of the symbol file.  Only present if <b>XML symbol file</b> has been selected as a source when selecting the import source.
<b>PLC</b>	Selection of the controller, if variables are imported, from a list.  The list of controllers corresponds to the configuration of the driver configuration (as configured in connection (on page 21)).
<b>Back</b>	Switches to the previous window.
<b>Next</b>	Accepts setting and switches to the next window.  Note: If no connection is configured or selected, it is not possible to switch to the next window.
<b>Cancel</b>	Cancels the import. No variables are imported.
<b>Help</b>	Opens online help.

## CONFIGURATION OF THE FILTER

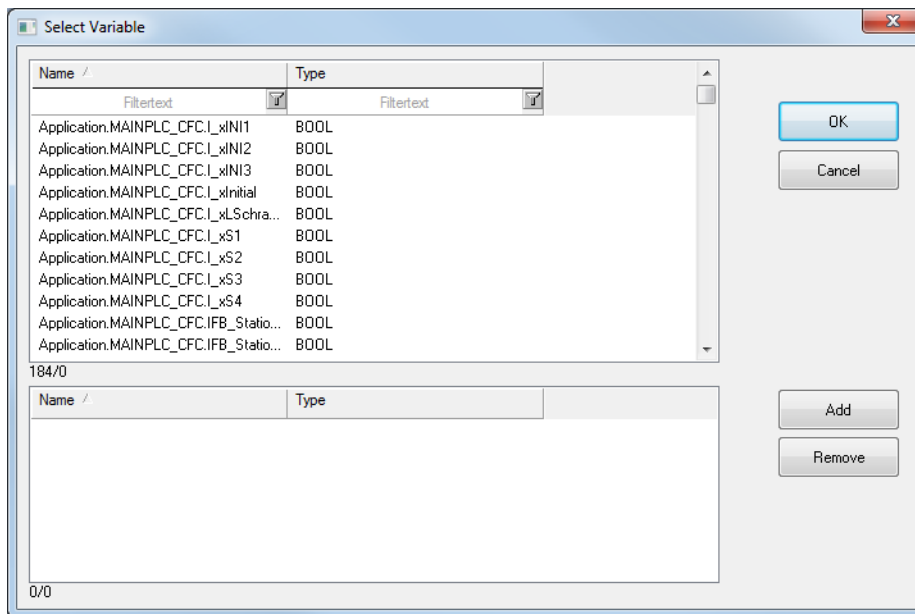
When importing a variable, the variables to be imported can be filtered.

Either all existing or only new variables are offered for selection. In addition, variables that are no longer needed can be searched for and deleted.



Parameters	Description
<b>Symbol name</b>	<p>Entry of the symbol name as a filter criteria.</p> <p>The name can be entered with the following parameters:</p> <ul style="list-style-type: none"> <li>▶ *</li> <li>▶ ?</li> </ul> <p>Default: *</p> <p>Selects all symbol names, no prefiltering.</p>
<b>Data Type</b>	<p>Entry of a data type in the combobox or selection from a drop-down list.</p> <p>The following placeholders can be used for input:</p> <ul style="list-style-type: none"> <li>▶ *</li> <li>▶ ?</li> </ul> <p>Default: *</p> <p>Selects all data types, no prefiltering.</p>
Prefilter	<p>Option field to prefilter the displayed variables in the subsequent dialog (variable selection dialog):</p> <ul style="list-style-type: none"> <li>▶ Import all matched symbols Offers all symbols that correspond to the filter for import.</li> <li>▶ Import only new symbols Offers only symbols that are not yet present in the zenon project for import.</li> <li>▶ Delete old symbols Offers all symbols that exist in the zenon project that do not exist in the controller for deletion.</li> </ul>
<b>Back</b>	Switches to the previous window.
<b>Finish</b>	Applies setting and opens the variable selection dialog.
<b>Cancel</b>	Cancel the import. No variables are imported.
<b>Help</b>	Opens online help.

## VARIABLE SELECTION DIALOG



Parameters	Description
<b>List of variables that can be imported</b>	Displays all variables that can be imported or deleted depending on the settings in the wizard.  The list can be sorted and filtered.
<b>List of variables to be imported</b>	Displays all variables that are selected for import or deletion.
<b>Add</b>	Adds the variables highlighted in the <b>Importable variables</b> list to the <b>Variables to be imported</b> list. Multiple selection from the list is possible.
<b>Remove</b>	Deletes highlighted variables from the <b>Variables to be imported</b> list. Multiple selection from the list is possible.
<b>OK</b>	Accepts selection and imports or deletes variables.
<b>Cancel</b>	Cancels the import and closes the wizard. No variables are imported.

## 7.5 Driver variables

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

- ▶ Information
- ▶ Configuration

- ▶ Statistics and
- ▶ Error message

The definitions of the variables implemented in the driver kit are available in the import file **drvvar.dbf** (on the installation medium in the `\Predefined\Variables` folder) 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 ErrorMSG 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	24.10	Connection in hold
LineStateConferenced	BOOL	24.11	Connection in conference mode.
LineStateOnHoldPendConf	BOOL	24.12	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 <b>OFF</b> bit. After the driver has started, the variable has the value <code>FALSE</code> and no <b>OFF</b> 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 <b>PhoneNumberSet</b> and <b>ModemHwAdrSet</b> .

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	TRUE, if update time is global
TreiberSimul	BOOL	5	TRUE, if driver in sin simulation mode
TreiberProzab	BOOL	6	TRUE, 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.
Baudrate	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 <b>Normal</b> in milliseconds (ms).
MaxUpdateTimeHigher	UDINT	57	Time since the last update of the priority group <b>Higher</b> in milliseconds (ms).
MaxUpdateTimeHigh	UDINT	58	Time since the last update of the priority group <b>High</b> in milliseconds (ms).
MaxUpdateTimeHighest	UDINT	59	Time since the last update of the priority group <b>Highest</b> in milliseconds (ms).
PokeFinish	BOOL	55	Goes to 1 for a query, if all current pokes were executed

## ERROR MESSAGE

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:

### REAL-TIME CAPABILITY

The driver is real-time capable.

In doing so, note:

- ▶ The protocol only provides the time stamp with precision to the second.
- ▶ The time of the SCADA system and PLC must be synchronized manually.

### RDA

### PROBLEM

The RDA mechanism actually needs a coherent block from zenon in the controller, which can be addressed via an offset. RDA is therefore generally not possible for drivers with symbolic addressing.

## SOLUTION

The 3S\_V3 driver uses a property of the PLC handler that makes it possible to read the whole binary data block of variables with complex types (structures, arrays) as a whole using the base name.

The driver determines the base name by separating the last dot (.) from the symbol name of the trigger variable and using the name it has obtained this way. The trigger variable must be the first element of a structure in order for this to work. The rest of the structure can be created as desired. When reading the overall structure, only the binary data that has been read in when creating the RDA data according to the zenon documentation ([archivserver.chm::/28257.htm](http://archivserver.chm::/28257.htm)) needs to correspond.

## EXAMPLES

### RDA-TYP 3:

```

TYPE RDA_DATA_3 :                                (* Structure for RDA type 3 payload *)
  STRUCT
    Value : DINT;                                (* value
    TimeStamp : ARRAY[0..7] OF BYTE;            (* Time stamp (year, month, day, hour, minute,
second, 1/100th second, reserve) *)
  END_STRUCT
END_TYPE

```

```

TYPE RDA_3 :                                     (* Structure for RDA type 3 *)
  STRUCT
    Trigger : DINT;                              (* trigger variable *)
    Count : UDINT;                               (* Number of data sets *)
    Cycle : UDINT;                               (* Cycle time in [ms] (only relevant for
type 1 and 4) *)
    RDA_Type : UDINT;                            (* RDA type, 1 - 4 *)
    Oldest : UDINT;                             (* Index of the oldest value (placeholder
for compatibility reasons, only relevant for type 1) *)
    Data : ARRAY[0..19] OF RDA_DATA_3;          (* Payload *)
  END_STRUCT
END_TYPE

```

### RDA-TYP 4:

```

TYPE RDA_4 :                                     (* Structure for RDA type 4 *)
  STRUCT
    Trigger : DINT;                              (* trigger variable *)
    Count : UDINT;                               (* Number of data sets *)

```

```

    Cycle : UDINT;                (* Cycle time in [ms] (only relevant for
type 1 and 4 *)
    RDA_Type : UDINT;            (* RDA type, 1 - 4 *)
    Oldest : UDINT;             (* Index of the oldest value (placeholder
for compatibility reasons, only relevant for type 1) *)
    TimeStamp : ARRAY[0..7] OF BYTE; (* Time stamp of the first value (year, month, day,
hour, minute, second, 1/100th second, reserve) *)
    Data : ARRAY[0..19] OF DINT;  (* Payload *)
END_STRUCT
END_TYPE

```

If, for example, an `RDA_4` type **RDA\_Test** variable is created in the CoDeSys project, then a variable with the symbolic address **RDA\_Test.Trigger** is created in zenon, and `HD_active` and `Updated` values are set. If the variable changes value from 0 to 1, the **.Trigger** part of the symbol name **RDA\_Test.Trigger** is cut off and **RDA\_Test** is read in as a binary data block. The RDA processing is then carried out with this data block.

## EXCEPTION HANDLING

Error events can be reported to zenon by the controller with the help of exception handling and assigned to an alarm variable using an ID.

For the replacement of error events, several blocks in the following form are created - in an array for example:

```

TYPE ST_ISA_ALARM :
STRUCT
    ID : DINT;                // identification for error location and type
    Value : DINT;            // error value, code, ...
    Message : STRING(80);    // error message
    TimeEvent.AlmDate : DATE; // date received (UTC)
    TimeEvent.AlmTime : TIME_OF_DAY; // time received (UTC)
    TimeAck.AlmDate : DATE;  // date cleared (UTC)
    TimeAck.AlmTime : TIME_OF_DAY; // time cleared (UTC)
    AlarmState : USINT;     // alarm status (received/cleared)
    ComState : INT;        // Handshake
END_STRUCT
END_TYPE

```

For this, the following applies:

- ▶ The names of the structure fields can be issued freely.
- ▶ The form of the structure (data types) must be retained.  
Otherwise the data of an event can only be read with errors or incompletely.

#### Procedure:

- ▶ When an error occurs, the controller assigns any desired free block (handshake variable = 2) with the information on the event and then sets its handshake variable to 1. This signals to the driver that the block in question contains new data.
- ▶ When switching the handshake variable to 1, the driver reads the complete block and assigns the content using the alarm variables established via the ID in zenon.
- ▶ The symbol address of the block is determined from the symbol address of the handshake variables by cutting off the part after the last item.  
For example: Symbol address of the handshake variable is **Alarm[8].ComState**. This results in the symbol address of the block being **Alarm[8]**.
- ▶ The driver then sets the handshake variable to 2. This signals to the controller that the block is free again and can be used for new events.
- ▶ If an error occurs during evaluation, the driver sets the handshake variable to the value 4 and thus signals the error status to the controller.  
Errors are, for example: no alarm variable linked to the ID, error when reading, etc.

## ALARM STATUS

The content of the **AlarmState** field determines whether the alarm is received or cleared. Regardless of this, the value and the time stamp (in UTC) of the attendant alarm variables are determined:

- ▶ 0: Empty.  
No alarm, all other entries of the block are invalid.
- ▶ 1: Alarm received.  
The alarm variable gets the value 1 and the time stamp from **TimeEvent.AmlDate** and **TimeEvent.AmlTime**.
- ▶ 2: Alarm cleared:  
The alarm variable gets the value 0 and the time stamp from **TimeAck.AmlDate** and **TimeAck.AmlTime**.

## HANDSHAKE

For the signaling of new events, a zenon variable with the object type **Alarm Event** must be created in the zenon project for the handshake variable of each event block. Handshake variables are distinguished from other variables in zenon using this object type.

In order for the mechanism to work, the handshake variables must be requested for the complete duration of zenon Runtime. This can be effected using the **Permanently read variable** property, for example.



The handshake variables can have the following values:

- ▶ 0: Locked.  
The controller must not use the block for new events.
- ▶ 1: Read requested.  
The controller has allocated the block with new values and is making a request to read the block.
- ▶ 2: Read successful.  
The driver has read and evaluated the block successfully. The controller can use the block for new events again.
- ▶ 4: Read error.  
If an error occurs when evaluating the block, the driver sets the handshake variable to 4.

## ALARM VARIABLES

Alarm variables are for displaying the events from the controller zenon as alarms. They are distinguished from other variables of the driver in zenon using the `alarm variable`. They are linked to an event in the controller using the ID. The ID denotes the location and type of error.

Up to four variables can be linked to each ID: A variable that is always requested with a limit value defined as an alarm as well as three further optional variables for further information about the alarm. These variables can then be used, for example, in **dynamic limit value texts** of the alarm variables.

For linking, the symbol addresses of the variables must follow a fixed format:

Address	Type	Mandatory	Description
<b>Exception.&lt;ID&gt;.Alarm</b>	BOOL or numerical	X	Signals the alarm using a limit value of 1 defined as an alarm. If this variable is not present or not requested, this is considered an error and the driver sets the handshake variable to the value 4.
<b>Exception.&lt;ID&gt;.Value</b>	Numerical	--	Gets the value of the <b>Value</b> field of the event block and can, for example, be used to denote an error code
<b>Exception.&lt;ID&gt;.Message</b>	STRING	--	Gets the value of the <b>Message</b> field of the event block and can take an error text
<b>Exception.&lt;ID&gt;.Info</b>	STRING	--	Gets a summary of the event in the following format: <b>&lt;ID&gt;;&lt;Value&gt;;&lt;Message&gt;;&lt;Alarm State&gt;;&lt;ComState&gt;;&lt;TimeEvent&gt;;&lt;TimeAck&gt;</b> Example: <b>300010011;300010011;exception message1;2;1;2015-07-15T06:08:22,329+2.00;2015-07-15T06:08:38,829+2.00</b>

Attention: Note upper-case/lower-case letters.

Examples for the symbol addresses of alarm variables (ID =**300010011**):

- ▶ **Exception.300010011.Alarm**
- ▶ **Exception.300010011.Value**
- ▶ **Exception.300010011.Message**
- ▶ **Exception.300010011.Info**

The names of the alarm variables can be issued freely.

#### ACTION WHEN ESTABLISHING A CONNECTION TO THE PLC

If the driver establishes a connection to the PLC, it attempts to determine the current status of the alarm events. To do this, it is not just alarm events whose Handshake variables have the value 1 (*read requested*) that are evaluated, but also those with value 2 (*read required*). The alarm variables can thus be set to the status before closing the connection again. This action is applicable for the start of zenon Runtime as well as for the restoring after a connection has been lost.

Alarm variables for which there are no entries in the event array are set to an initial value (0 or empty string). As a result, pending alarms get the status of *cleared*.

**Attention:** For a correct evaluation, it is necessary that the `received` event and the `cleared` events of an alarm are always in the same event entry in the array.

## RESPONSE TO THE PLC

Whilst the connection is being established, the PLC should prevent values changing in the event array.

To do this, create, for each connection to a PLC, a variable with the `status feedback` object type in zenon. This reports the current run-up status to the PLC. These variables can take the following values:

- ▶ `-1:Not Running`  
Connection terminated.  
Before closing the connection properly (when closing Runtime), the status feedback variable is set to Not Running.
- ▶ `0:Initial`  
Connection reestablished, start of restart.  
The value only occurs when reestablishing the connection, not when starting Runtime. At this point in time, there are not yet any variables requested by Runtime, so there value can therefore not be set
- ▶ `10: Starting`  
During the request of variables at the PLC.
- ▶ `100:Running`  
Once the initial values have been received by the PLC.

The PLC should prevent new events whilst the `status feedback` variable has the value `Starting`.

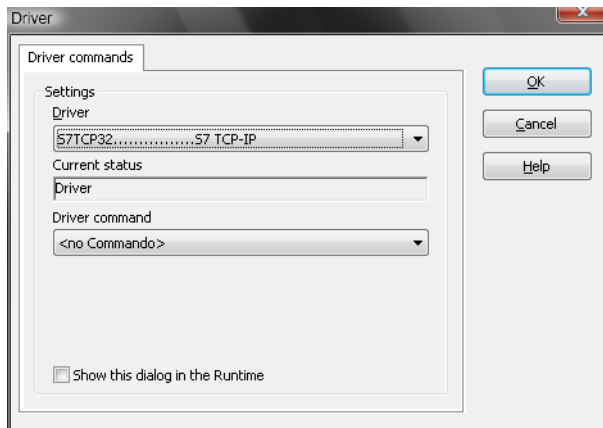
## 9. Driver commands

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



Parameter	Description
<b>Drivers</b>	Drop-down list with all drivers which are loaded in the project.
<b>Current status</b>	Fixed entry which has no function in the current version.
Driver command	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. <b>Note:</b> If the driver is in offline mode, all variables that were created for this driver receive the status <code>switched off (OFF; Bit 20)</code> .
▶ 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.
▶ Driver - activate set setpoint value	Write set value to a driver is allowed.
▶ Driver - deactivate set setpoint value	Write set value to a driver is prohibited.
▶ Establish connecton 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)
<b>Show this dialog in the Runtime</b>	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 7.50 -> Diagviewer.

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

```
%ProgramData%\COPA-DATA\LOG. 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 newly-created entries in real time
- ▶ customize the logging settings
- ▶ change the folder in which the LOG files are saved

Note:

1. The Diagnosis Viewer displays all entries in UTC (coordinated world time) and not in local time.
2. 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.
3. If you only use **Error-Logging**, the problem description is in the column **Error text**. For other diagnosis level the description is in the column **General text**.
4. For communication problems many drivers also log error numbers which the PLC assigns to them. They are displayed in **Error text** or **Error code** 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.
5. 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**.



### Attention

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

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

## 10.2 Error numbers

Note: The following description is only available in English.

Error text in the LOG	No.	Meaning
RESULT_FAILED	-1	Action erroneous.
RESULT_OK	0	Action successful
RESULT_PLC_NOT_CONNECTED	1	PLC not connected
RESULT_PLC_LOGIN_FAILED	2	Login to PLC has failed
RESULT_PLC_NO_CYCLIC_LIST_DEFINED	3	No cyclic list has been found
RESULT_PLCHANDLER_INACTIVE	4	PLCHandler instance was set inactive
RESULT_LOADING_SYMBOLS_FAILED	5	Loading of the symbols has failed
RESULT_ITF_NOT_SUPPORTED	6	The defined communication interface is not valid or not supported
RESULT_COMM_FATAL	7	Communication error occurred during action
RESULT_NO_CONFIGURATION	8	Wrong or erroneous configuration of the PLCHandler
RESULT_INVALID_PARAMETER	9	At least one parameter is invalid
RESULT_ITF_FAILED	10	Communication interface could not be initialized correctly (e. g. Gateway DLLs not available)
RESULT_NOT_SUPPORTED	11	Method not yet supported resp. implemented for this configuration (e. g. not supported for this interface)
RESULT_EXCEPTION	12	Handled exception in a low layer occurred during action
RESULT_TIMEOUT	13	Timeout exceeded
RESULT_STILL_CONNECTED	14	PLC already connected (at a further ::Connect() call)
RESULT_RECONNECTTHREAD_STILL_ACTIVE	15	Reconnect Thread already active (started at a further ::Connect() call)
RESULT_PLC_NOT_CONNECTED_SYMBOLS_LOADED	16	No connection to the PLC, but symbols available offline
RESULT_NO_UPDATE	17	Asynchronous operation (e. g. cyclic read of variables) has not yet finished
RESULT_OCX_CONVERSION_FAILED	18	Error during conversion of values inside the PLCHandler's ActiveX interface occurred
RESULT_TARGETID_MISMATCH	19	PLC does not match to the passed target id etc.
RESULT_NO_OBJECT	20	No object found for the required action (e. g. tried to get an element beyond the end of the list)
RESULT_COMPONENTS_NOT_LOADED	21	PLCHandler instantiation has failed, because of missing components



RESULT_BUSY	22	Last action still in progress, cannot start the required one
RESULT_DISABLED	23	Feature is disabled by the configuration (e. g. Logging)
RESULT_PLC_FAILED	24	Communication to the PLC was successful, but the PLC has returned a bad result

## 10.3 Check list

Questions and hints for fault isolation:

### GENERAL TROUBLESHOOTING

- ▶ Is the PLC connected to the power supply?
- ▶ Analysis with the **Diagnosis Viewer** (on page 62):  
-> Which messages are displayed?
- ▶ Are the participants available in the **TCP/IP** network?
- ▶ Can the PLC be reached via the `Ping` command?  
Ping: Open command line -> ping < IP address> (e.g. ping 192.168.0.100) -> press Enter.  
Do you receive an answer with a time or a time-out?
- ▶ Can the PLC be reached via `Telnet`?  
Telnet: Command line Enter open, telnet <IP address port number> (for example for Modbus: telnet 192.168.0.100 502) -> Press Return key.  
If the monitor display turns black, a connection could be established.
- ▶ Did you configure the Net address in the address properties of the variable correctly?
  - Does the addressing match with the configuration in the driver dialog?
  - Does the net address match the address of the target station?
- ▶ Did you use the right object type for the variable?  
Example: Driver variables are purely statistics variables. They do not communicate with the PLC. (See chapter Driver variable (on page 46).)
- ▶ Does the offset addressing of the variable match the one in the PLC?

### SOME VARIABLES REPORT INVALID.

- ▶ INVALID bits always refer to a net address.

- ▶ At least one variable of the net address is faulty.

#### VALUES ARE NOT DISPLAYED, NUMERIC VALUES REMAIN EMPTY

Driver is not working. Check the:

- ▶ Installation of zenon
- ▶ the driver installation
- ▶ The installation of all components  
-> Pay attention to error messages during the start of the Runtime.

#### VARIABLES ARE DISPLAYED WITH A BLUE DOT

The communication in the network is faulty:

- ▶ With a network project:  
Is the network project also running on the server?
- ▶ With a stand-alone project or a network project which is also running on the server:  
Deactivate the property **Only read from Standby Server** in node **Driver connection/Addressing**.

#### VALUES ARE DISPLAYED INCORRECTLY

Check the information for the calculation in node **Value calculation** of the variable properties.

#### DRIVER FAILS OCCASIONALLY

Analysis with the **Diagnosis Viewer** (on page 62):

-> Which messages are displayed?