TwinCAT Guide

Contents

Connection PLC to computer

Power the PLC

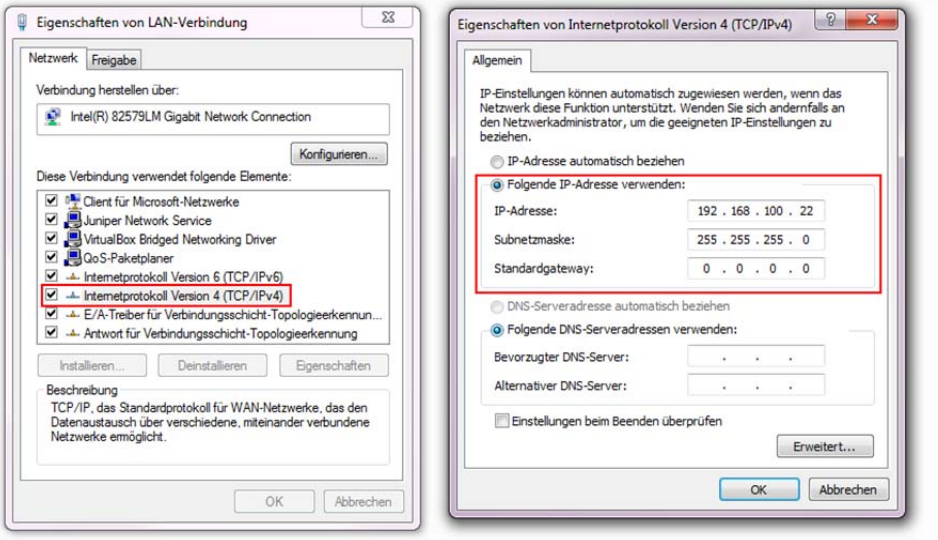
When the PLC is powered, it's LEDs should glow in the following colors:

1. *PWR:* green
2. *TC*: green (Run mode) or blue (Config mode)

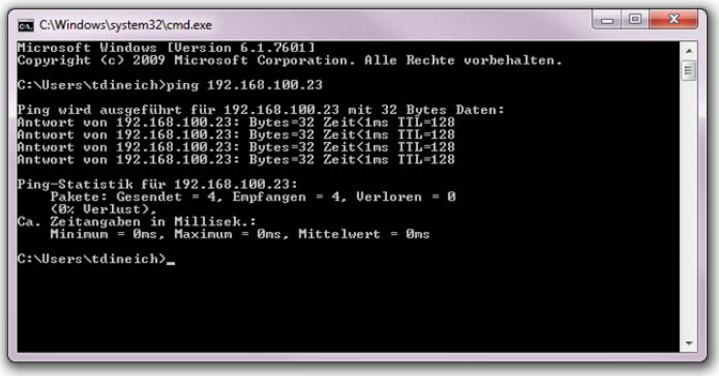
Establish connection

To work configure/program the PLC a connection with a computer needs to be established:

1. Connect PLC and computer via ethernet cable.
2. Change IP address of computer to be in the same subnetwork as PLC (see label on PLC).
   cmd: control netconnections



3. Use ping to check if the connection works.
   cmd: ping IP_Address_Of_PLC

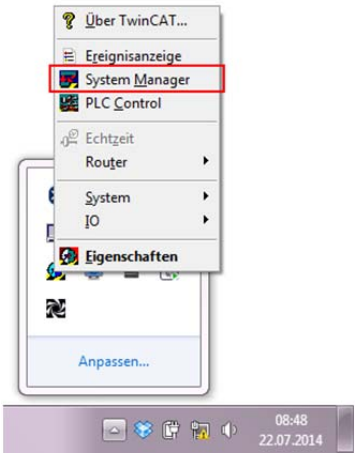


System Manager

Used to configure system and connect HW terminals to SW variables.

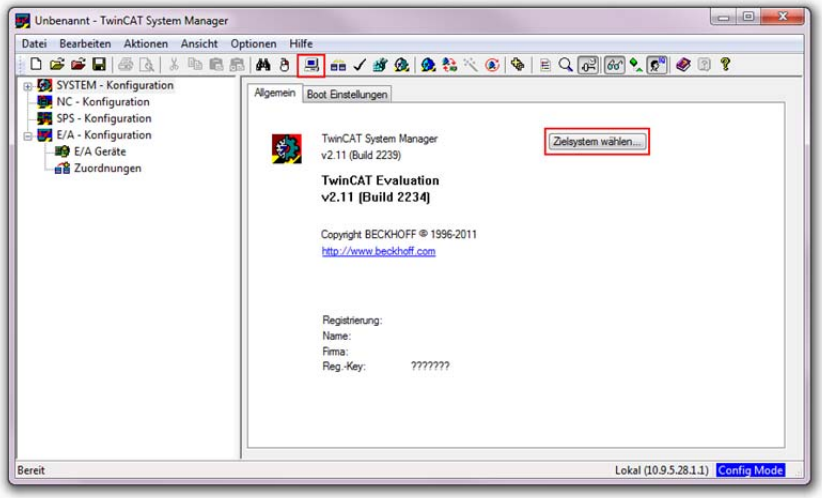
Open System Manager

The System Manager can be opened through the taskbar menu.

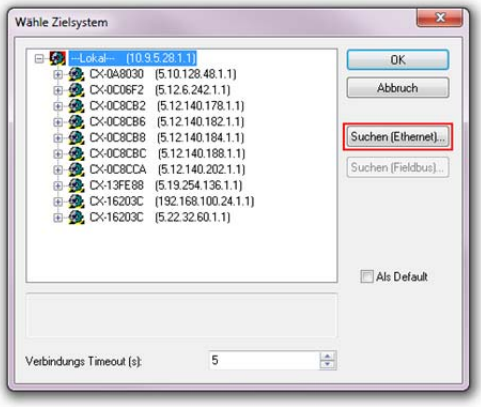


Select Target System

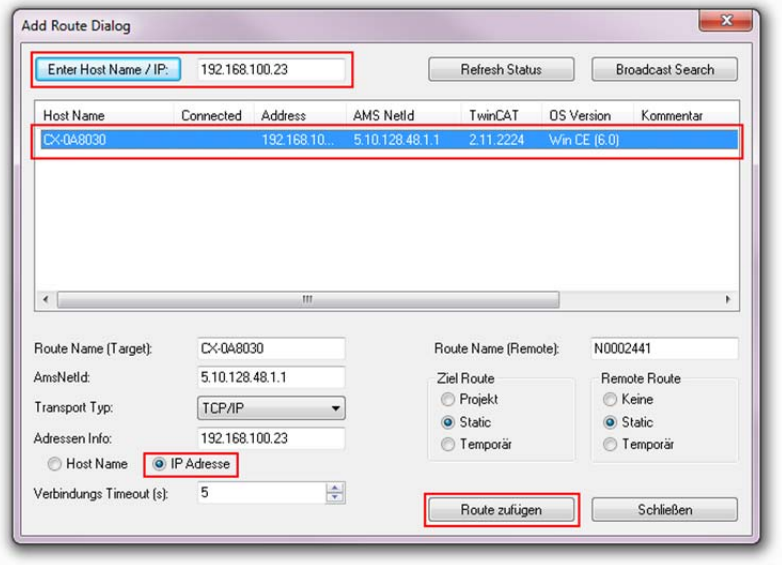
1. Click *Select Target System.*



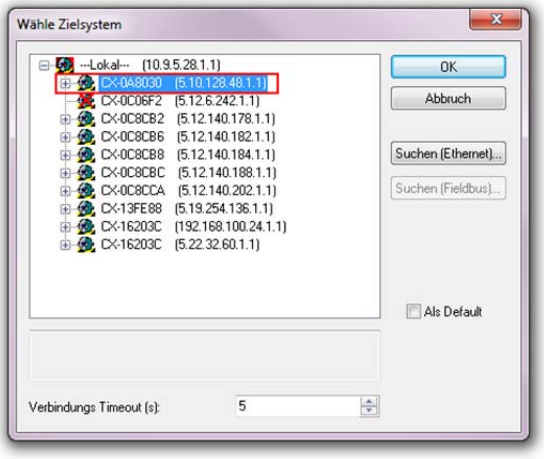
2. Click *Search (Ethernet)...*



3. Enter IP of PLC and click *Enter Host Name / IP.*
   Select the PLC from the list.
   Select *IP Address.*
   Click *Add route.*

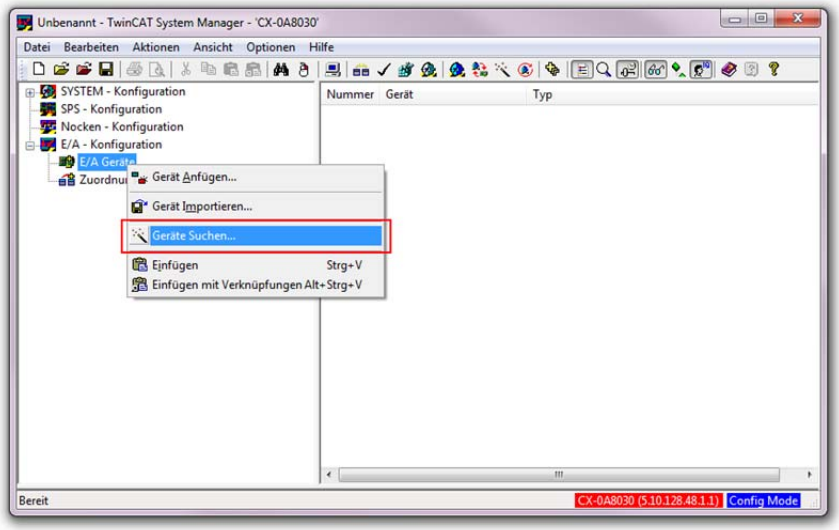


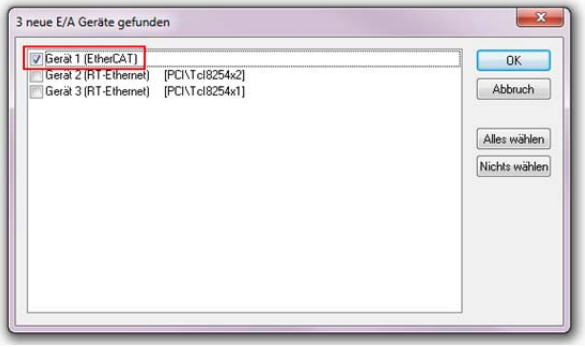
4. Select added PLC from list.



Automatic Terminal Configuration

Most Beckhoff terminals are recognized and can be configured automatically. The PLC needs to be in *Config Mode*.

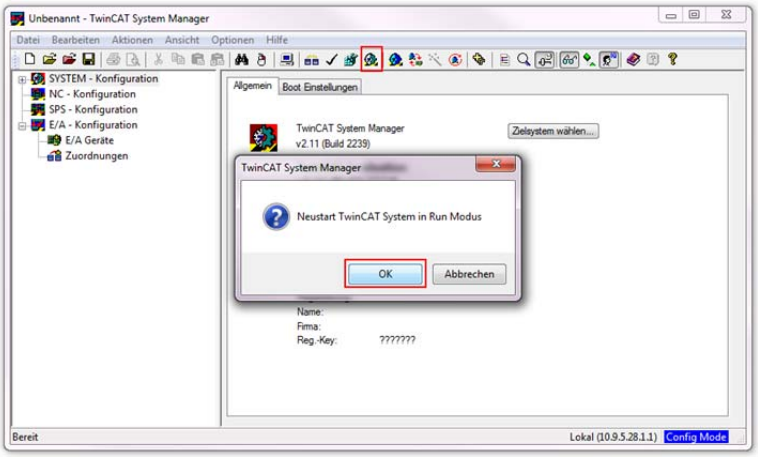




Modes

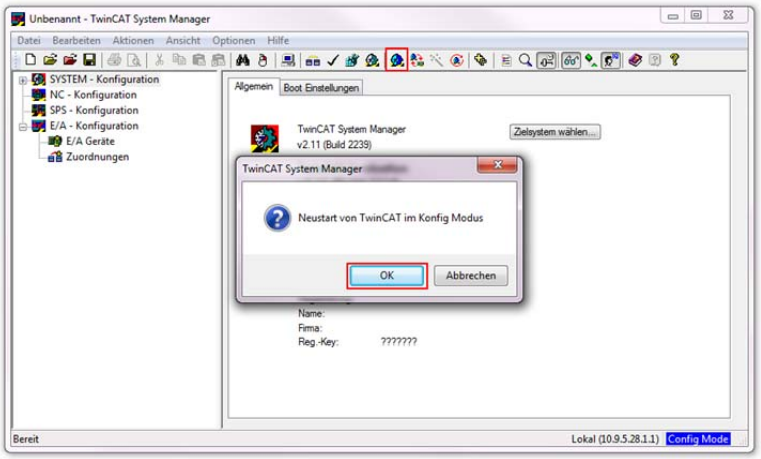
Run Mode

For PLC programs to run the system needs to be in *Run Mode.*



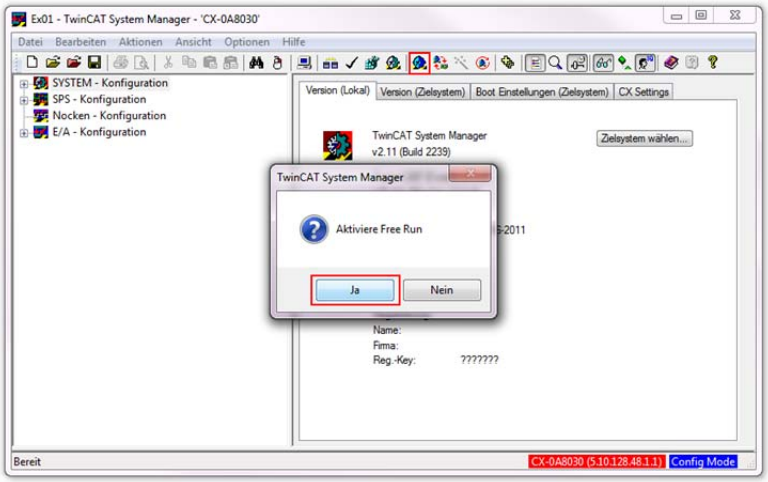
Config Mode

To configure the system (link SW variables to terminals etc.) the system needs to be in *Config Mode.*



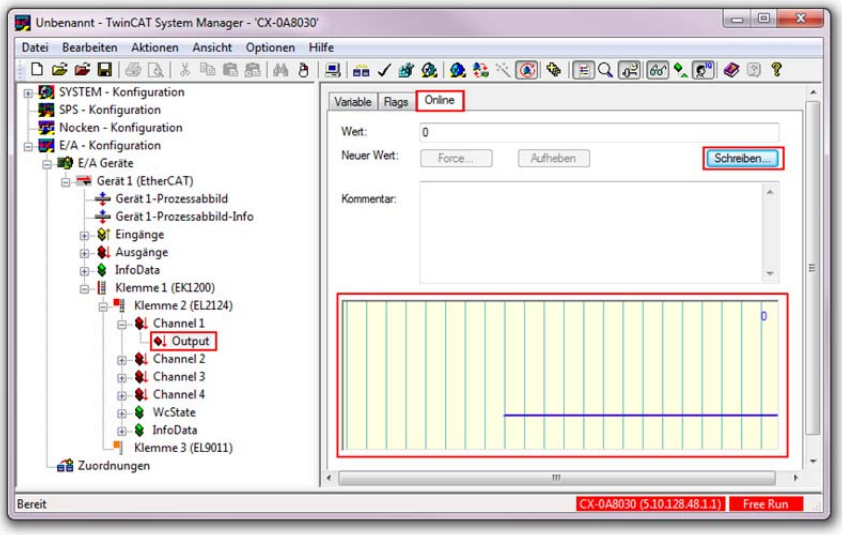
Freerun Mode

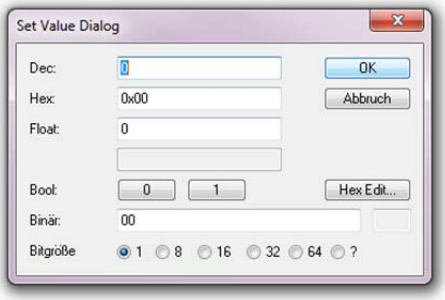
When changing to *Config Mode* user is asked if *Freerun Mode* should be activated. Terminal outputs can be controlled manually from System Manager during *Freerun Mode*.



Read inputs and write outputs

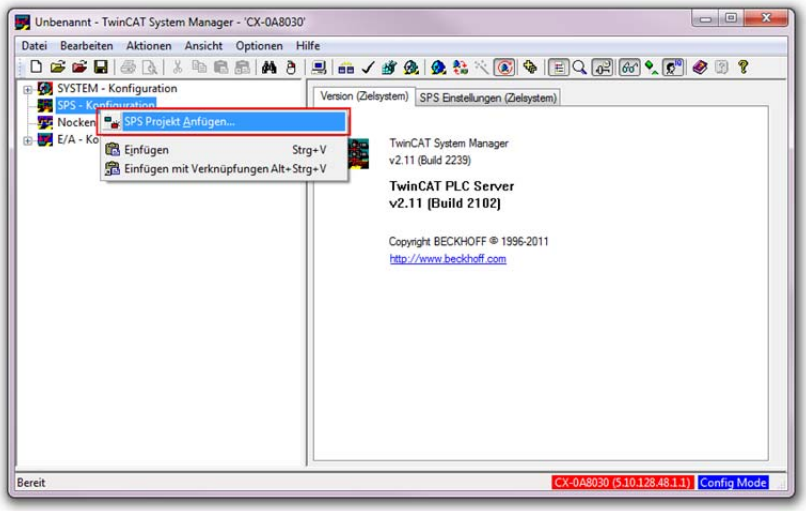
1. Select the input or output of the specific terminal.
2. Switch to the *Online* tab.
3. The signal's value is visible in the graph. If it is an output it can be changed with the *Write...* button.



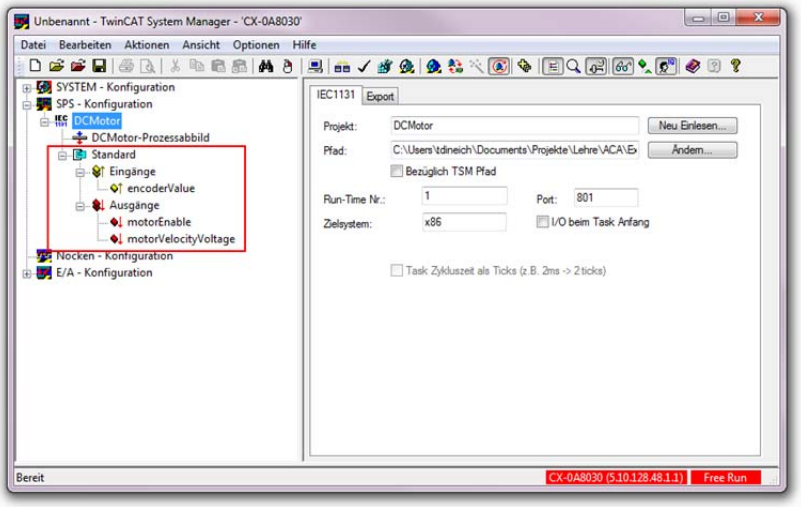


Append a PLC program

To make links between SW variables and terminals the PLC project has to be appended first.



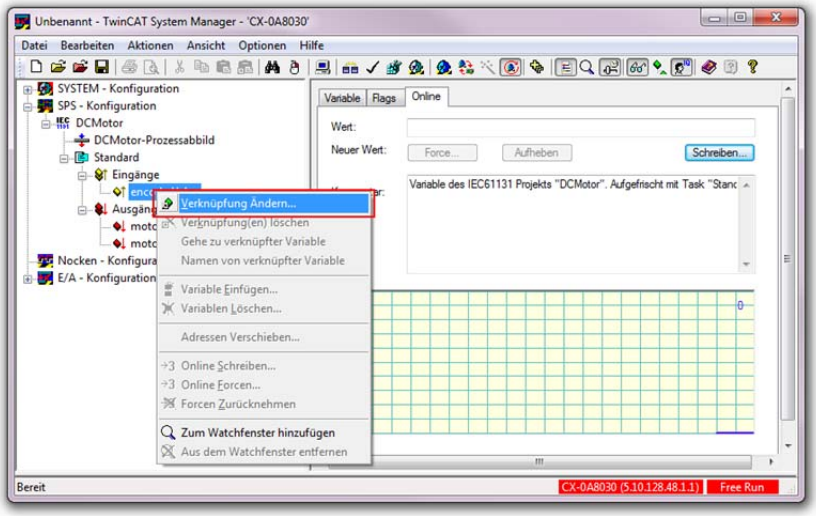
Afterwards the SW variables that can be linked show up here:



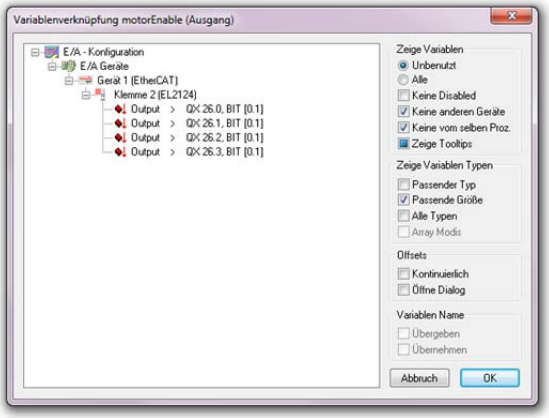
Links SW variables and terminal IOs

A SW variable and the linked terminal IO have the same value. E.g. if the input of a terminal changes it's value this can be seen in it's linked SW variable as well.

1. Select the SW variable or the terminal IO to link and select *Change link...*



2. Select a SW variable or terminal IO from the list:

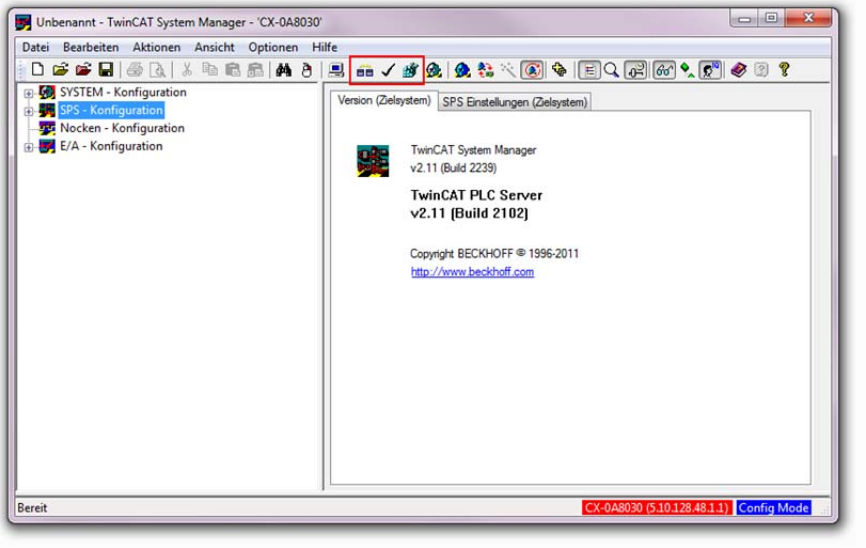


Activate configuration

This is done in 3 steps:

1. Create assignments: Builds a list of linked SW variables and terminal IOs
2. Check configuration: Validates the configuration.
3. Activate configuration: Writes configuration to PLC device.

Basically click the three icons one after each other from left to right.

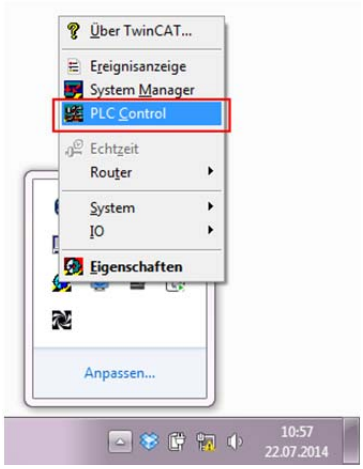


PLC Control

Used to program the logic. The program is executed in an endless loop.

Open PLC Control

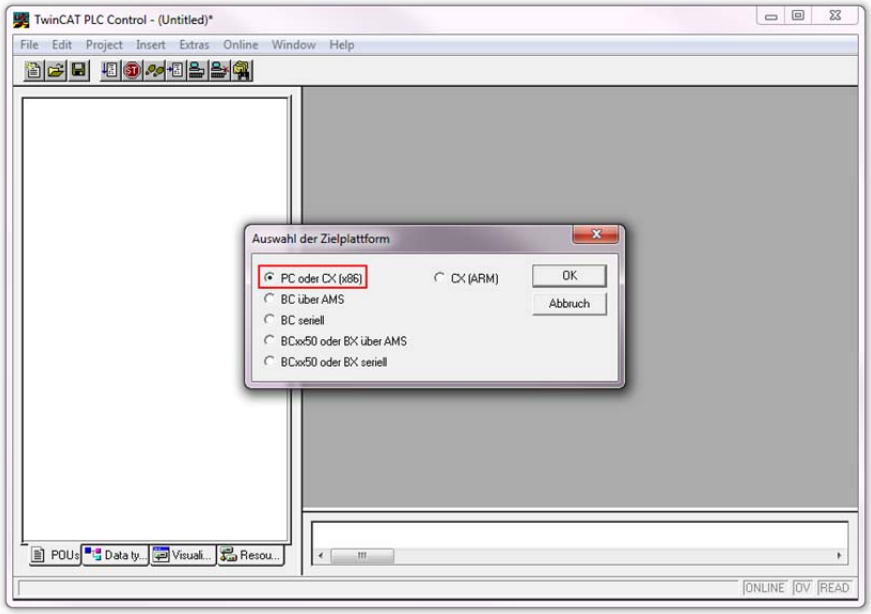
The PLC Control can be opened through the taskbar menu.



Create new PLC Program

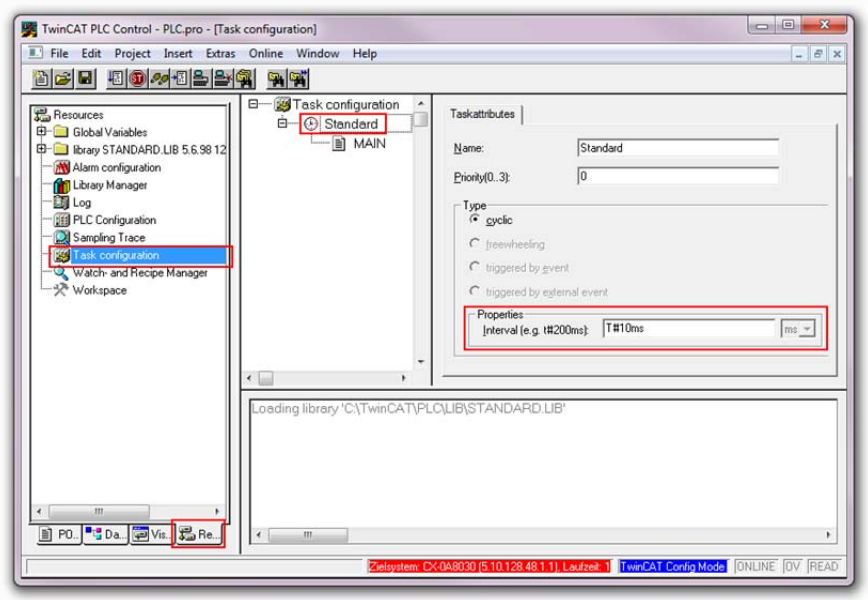
Mostly the target platform is x86 and the programming language is ST.

1. Select File/New.
2. Choose PC or CX (x86).
3. Choose name and select ST.



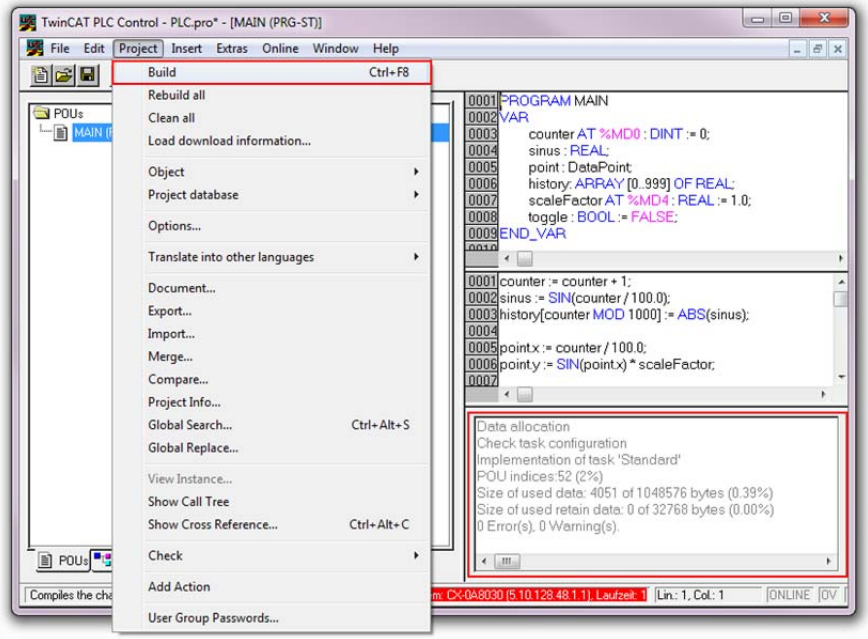
Change cycle time

The interval in which the program is exectuted can be changed here.



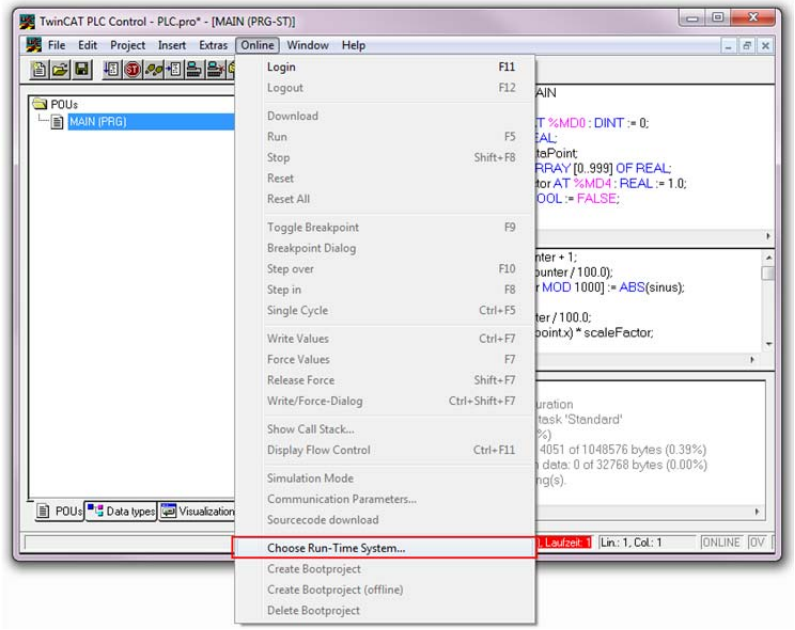
Compile the program

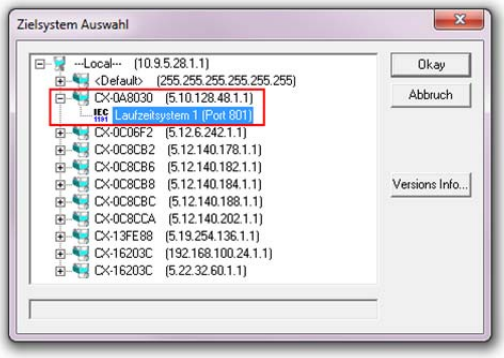
A program needs to compile successfully before it can be run on the PLC device.



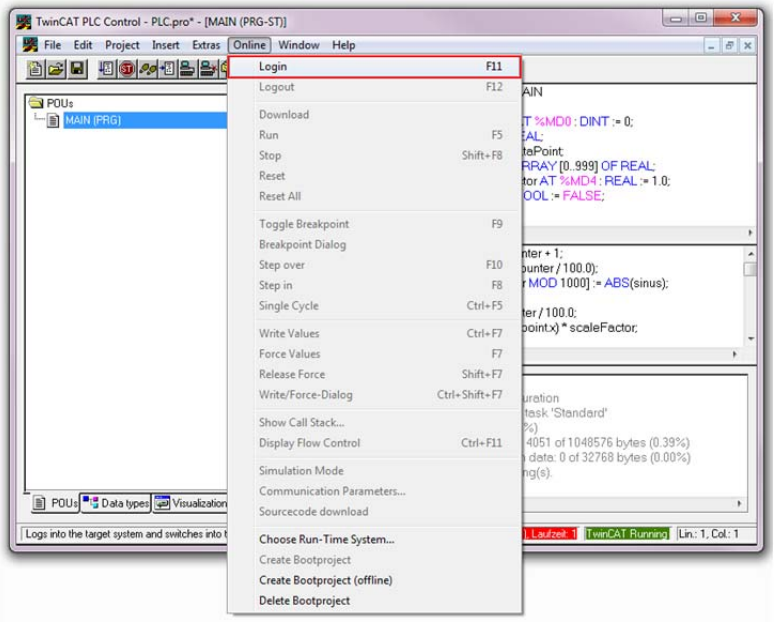
Run program

1. Choose the PLC device to run the program on:

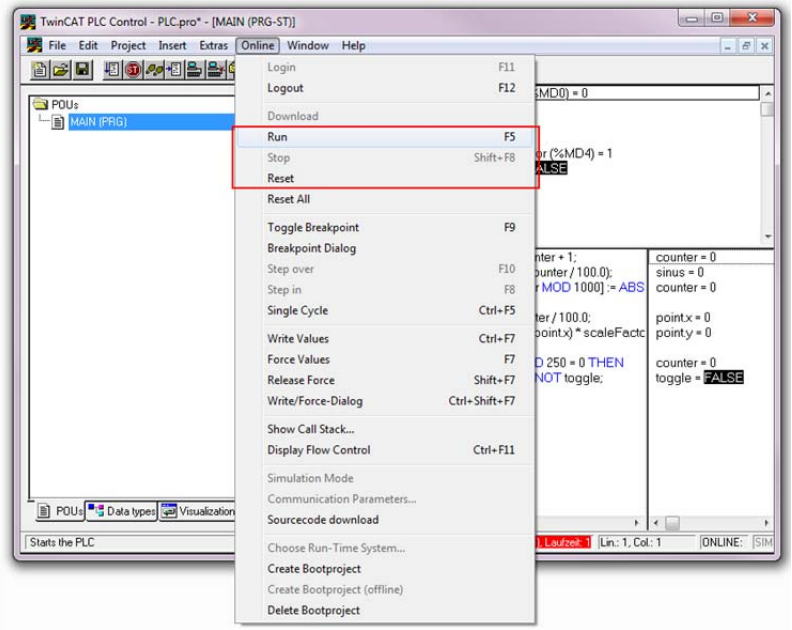




2. Go online (F11):



3. Run, stop or reset:
   - Run (F5): Runs the program.
   - Stop: Stops the running program.
   - Reset: Stops the running program and resets all variables to default values.

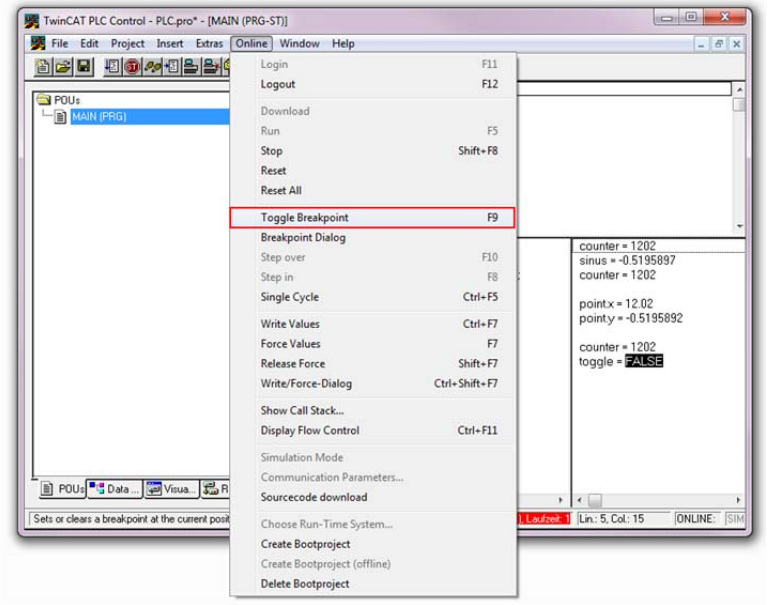


Debugging

Debugging helps to examine the program during runtime. This way errors and wrong program behaviour can be found and corrected. The values of variables can be analysed and changed if needed.

Breakpoints

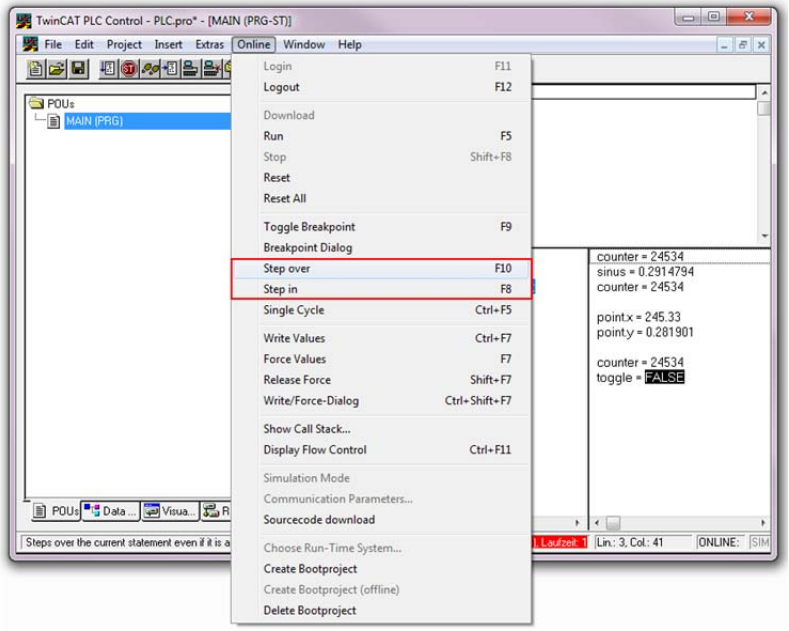
A line in the program code at which the execution breaks and waits for user input. *Toggle Breakpoint* (F9) creates/deletes a breakpoint at the selected line in the code. Execution can be resumed with *Run* (F5).



Stepping

When a breakpoint is hit stepping can be used to execute and examine the code line by line.

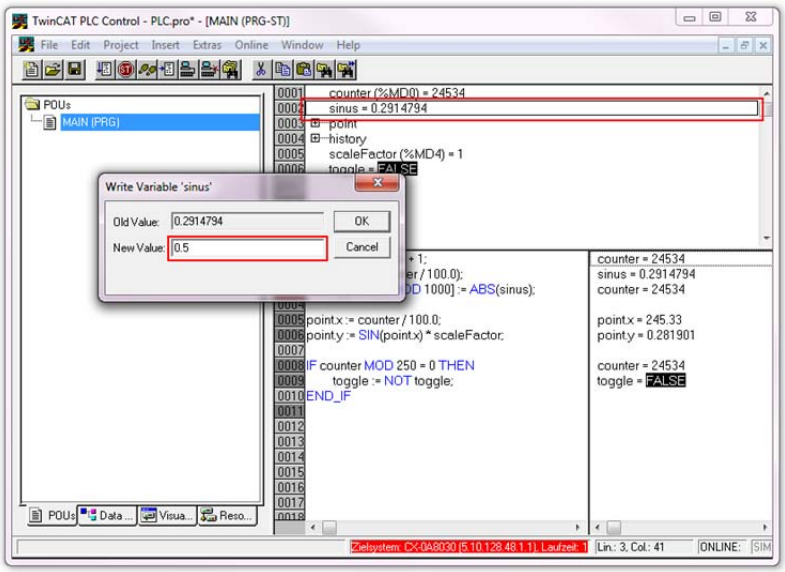
- Step over: Executes the next line of code and stays in the same program unit.
- Step in: Enters the next line of code if it is a call to a *FUNCTION*, *FUNCTION BLOCK* or *PROGRAM*.



Changing value of variable

While debugging the user is able to change the value of variables. This can be used to test certain conditions.

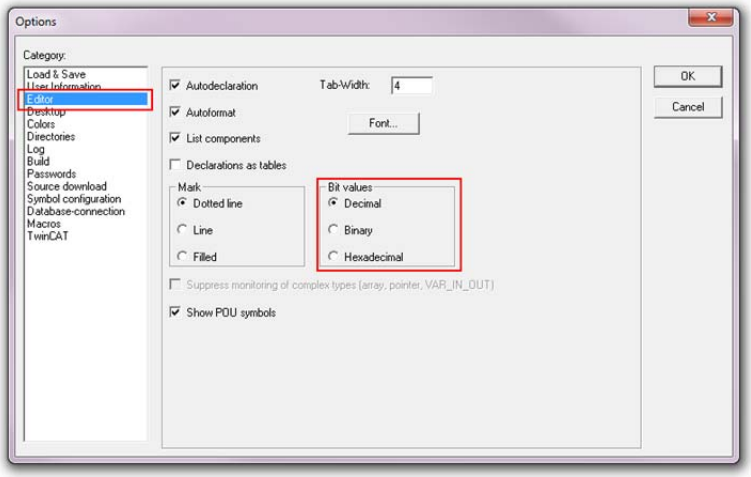
1. Double click on the variable to change.
2. Enter the new value and click *OK*.
3. Press *CTRL + F7* for the new value to be applied.



Change Data Format of Debugger

Variable values can be shown in different data formats: decimal, binary and hexidecimal.

1. Open *Project/Options...*
2. Set desired data format.



Scope

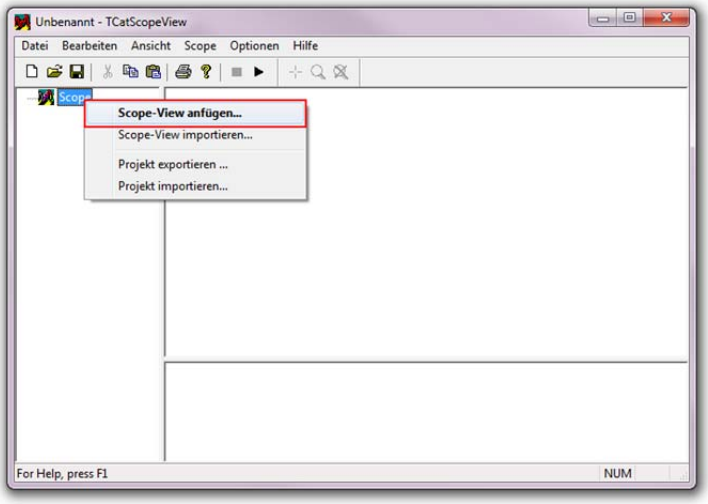
Open Scope

In a standard TwinCAT installation the scope is located at:
C:\TwinCAT\Scope\TCatScopeView.exe

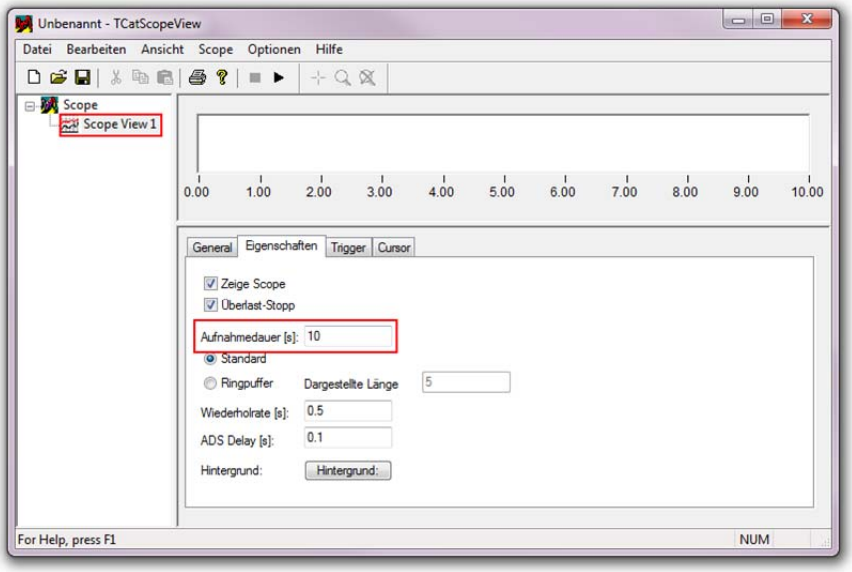
Configuration

To measure variables there are a few steps to follow:

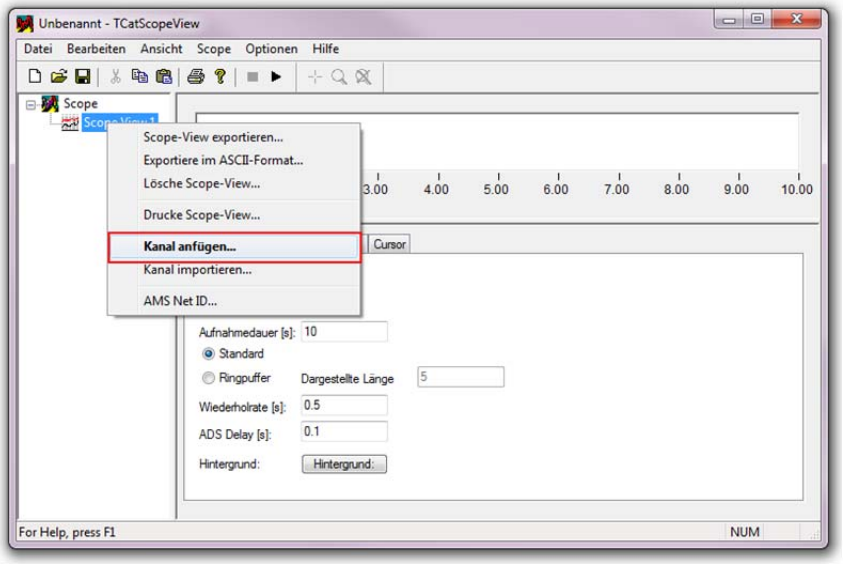
1. Add a view.



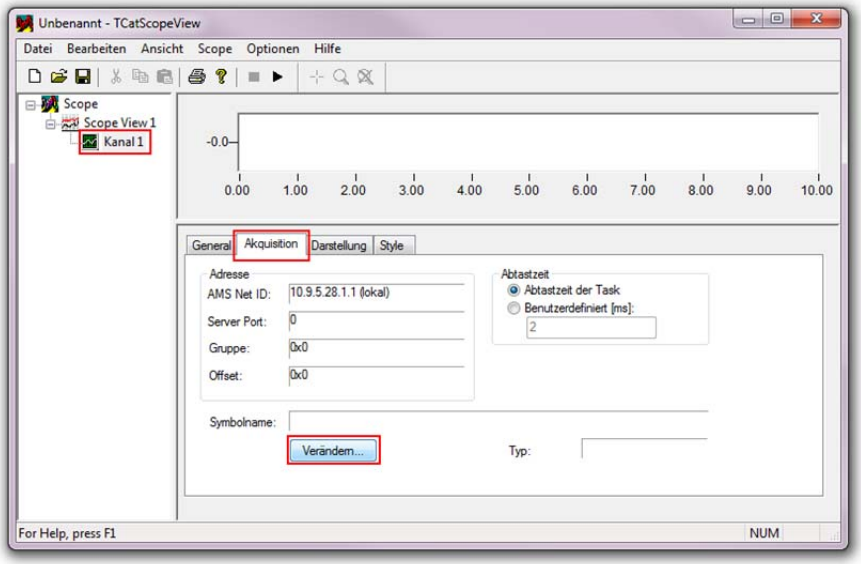
2. Set the duration of the measurement.

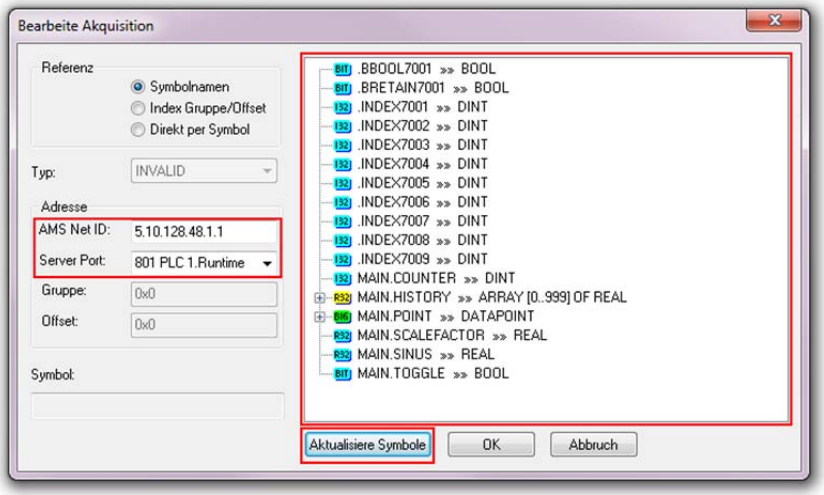


3. Add a channel (needed for each variable to be measured).



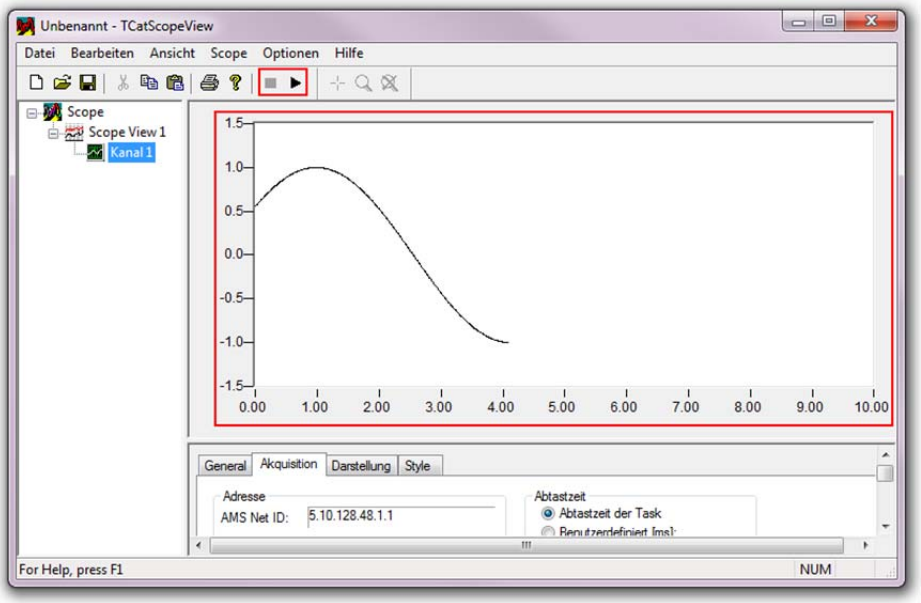
4. Set the variable the channel corresponds to. For this the *AMS Net ID* and *Server Port* have to be set. All available variables can be get by clicking *Update Symbols*. Select the desired variable afterwards.





Measure

Start and stop measurements.



Change axis limits

Sometimes the measurements are outside the visible area. To change the axis of a channel: