

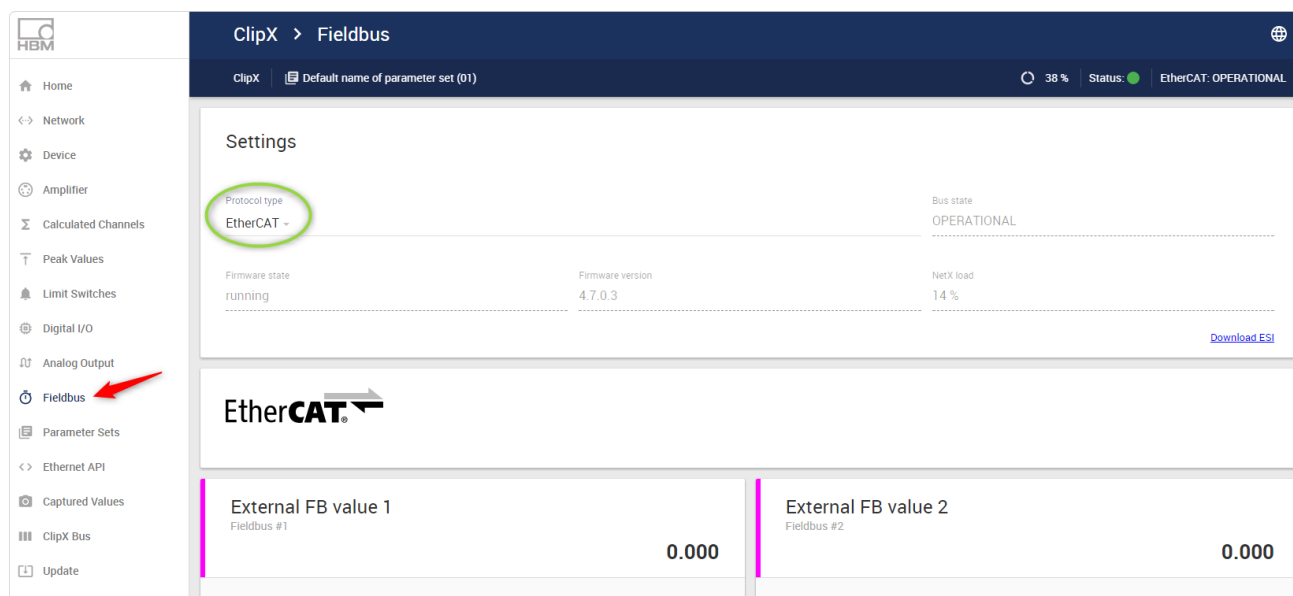
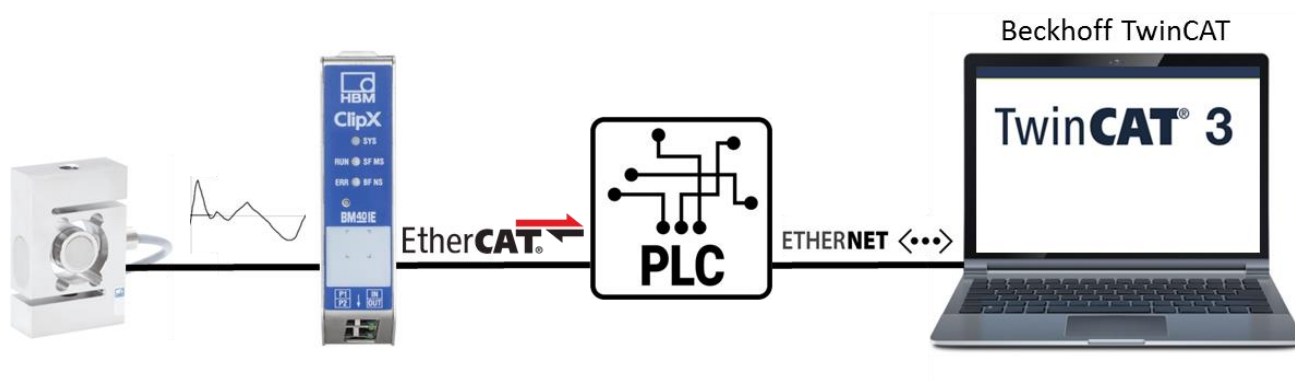
TECH NOTE – EtherCAT with TwinCAT

Version: 2018-11-29
Author: Michael Guckes
Status: HBM: Public

ClipX

Brief description

This document is meant to be a guideline to demonstrate the use of a ClipX signal conditioner within an EtherCAT network. For this example a Beckhoff PLC is used. There is also an explanation of how ClipX measurement values can be monitored in the Beckhoff TwinCAT software. Basic knowledge of EtherCAT network and HBM amplifiers are recommended. The basic setup is shown in the figure below.

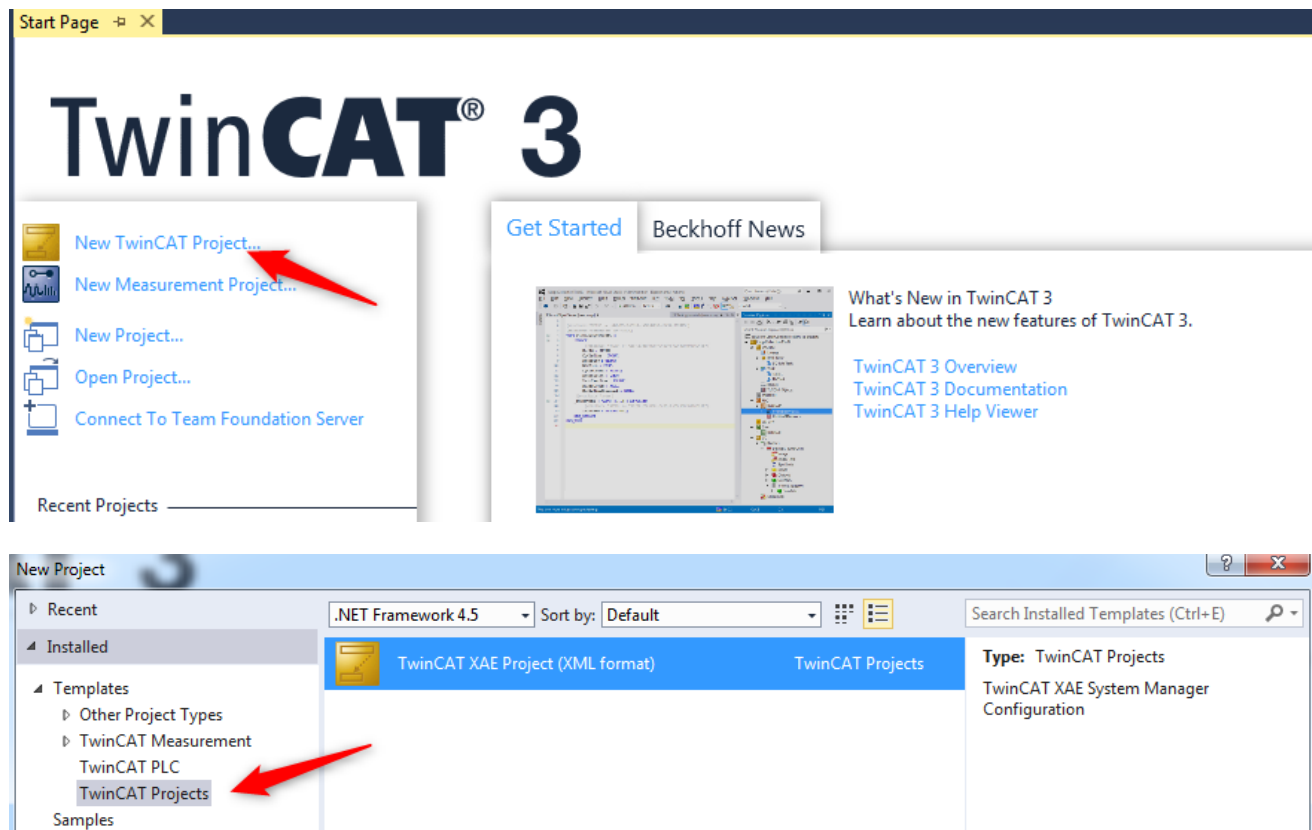


Operation

The ClipX amplifier system can be parameterized and operated via the internal web server, connected by the standard Ethernet cable to a PC. Connect ClipX with laptop via plug X1 to the USB Ethernet adapter. The present ClipX has the fix IP address 192.168.1.25. Type in the ClipX IP address into the web browser or double click on ClipX in Network. Make sure the right Fieldbus is selected. ClipX BM40IE is able to handle EtherCAT, Ethernet/IP and Profinet.

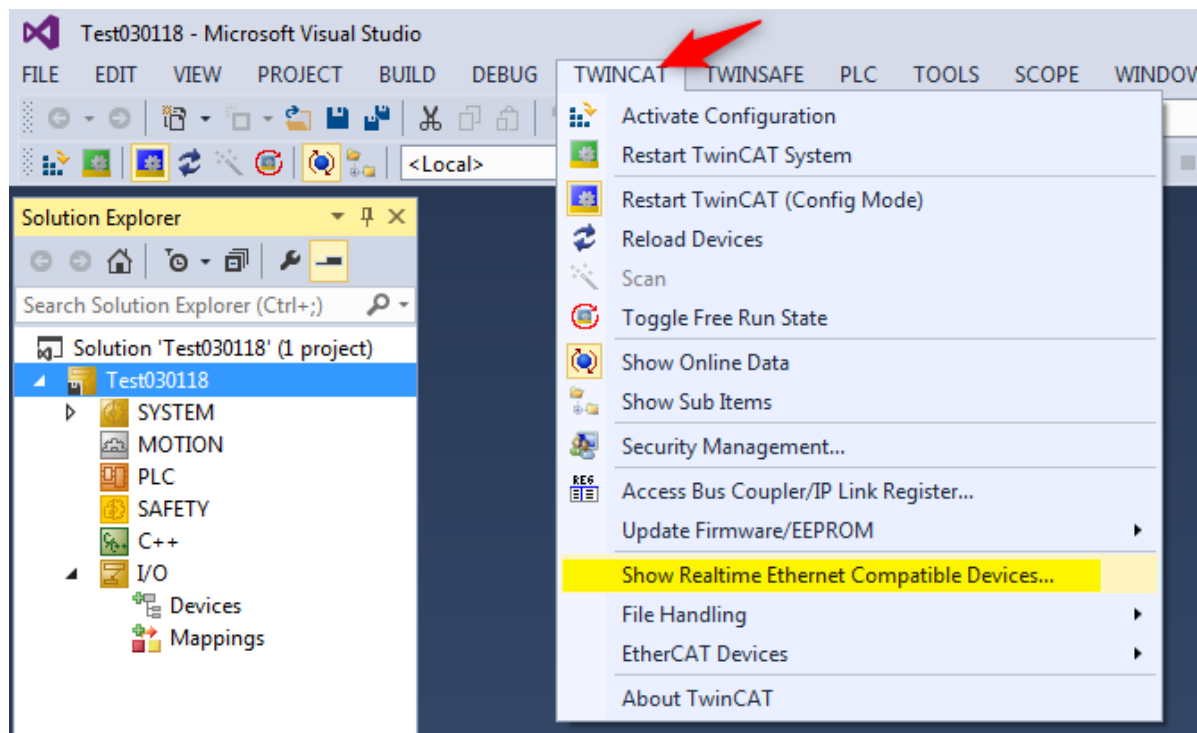
In this example the PLC program will run on our laptop. Connect ClipX plug X7 to laptops network card and start TwinCAT from Desktop.

Create a new project.

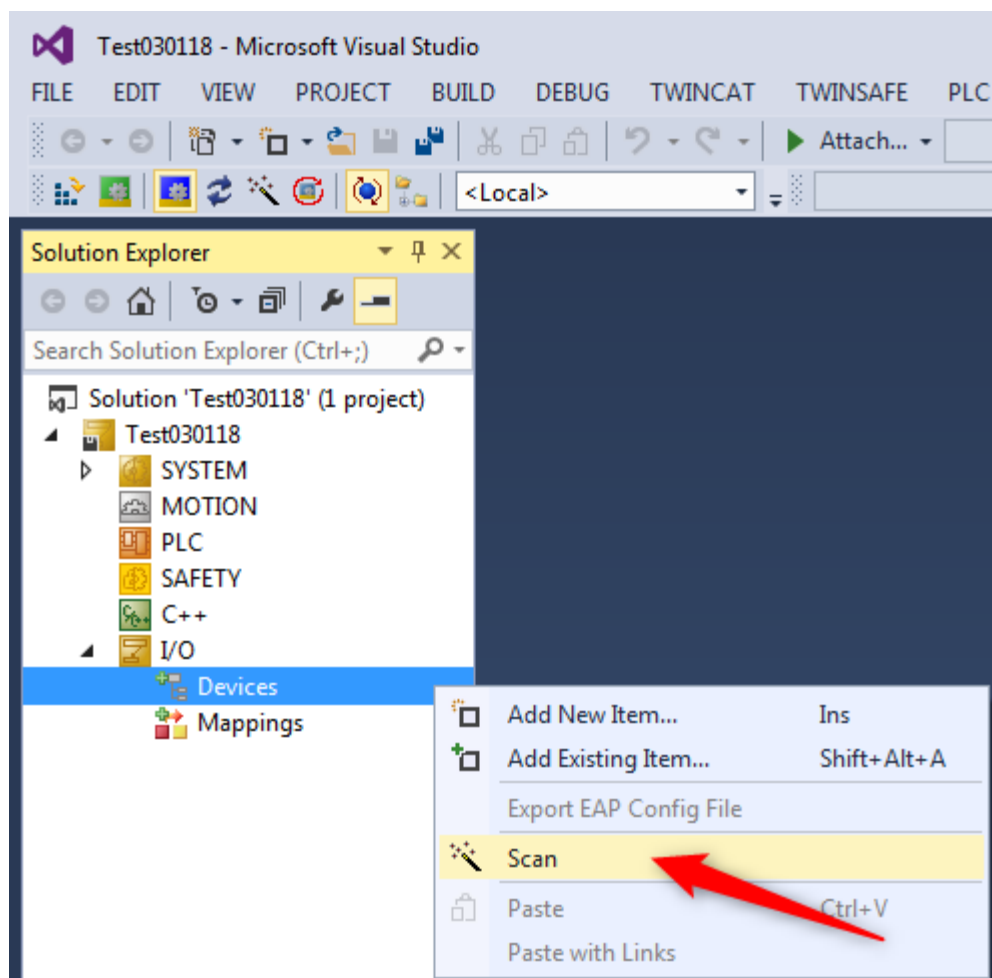


For configuration from ClipX the EtherCAT Master could use the ESI file generated from ClipX web browser. Or without ESI file, via device scan.

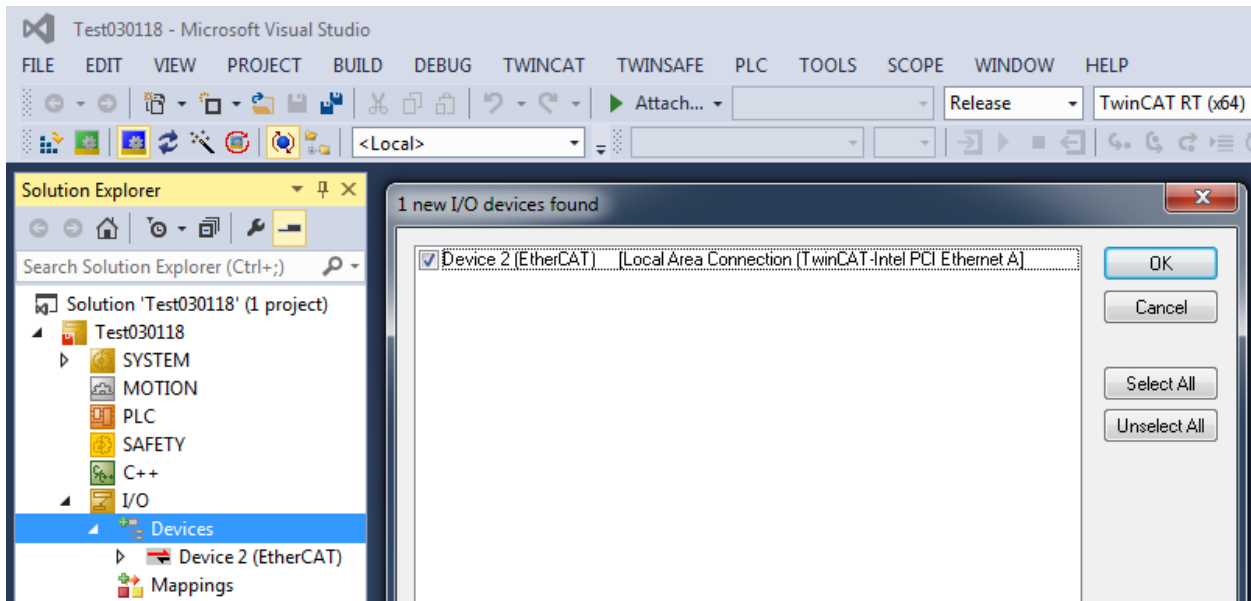
If you work the first time with TwinCAT, you have to assign at first your network card to TwinCAT. This step is already done. Just keep in mind.



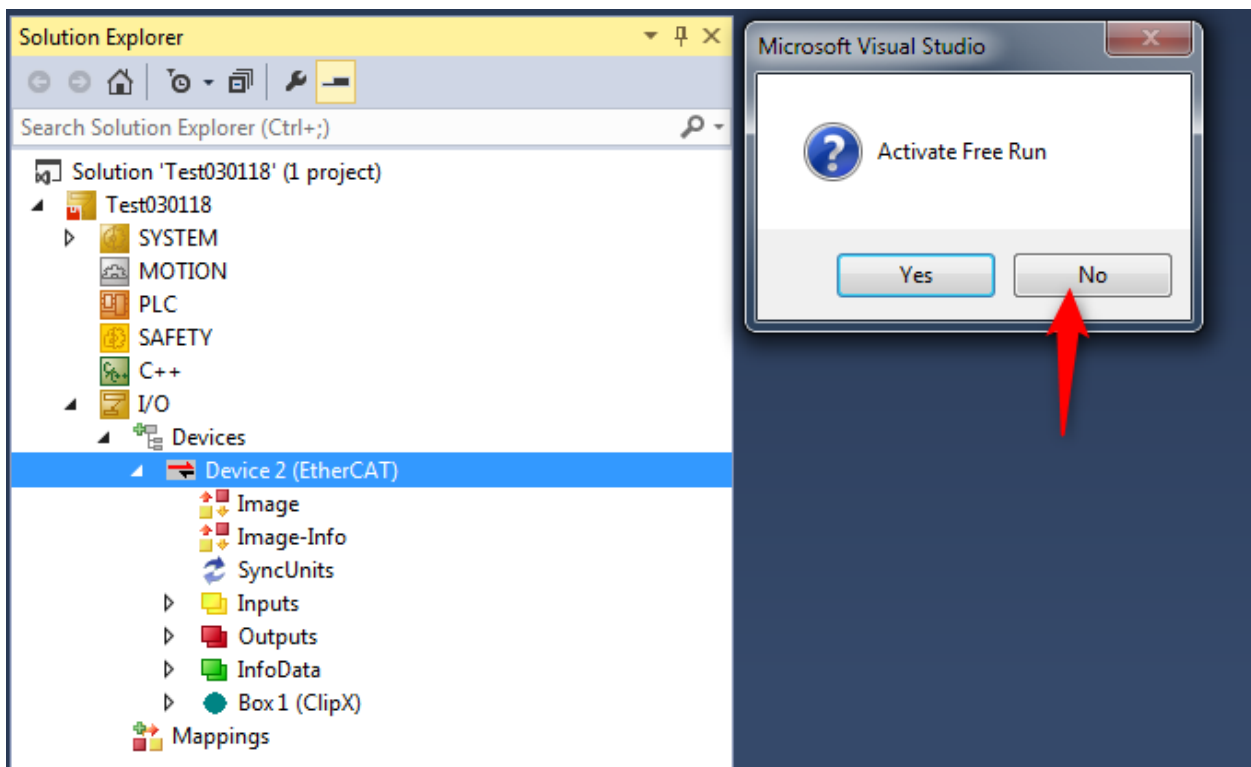
Right click on devices and scan for devices.



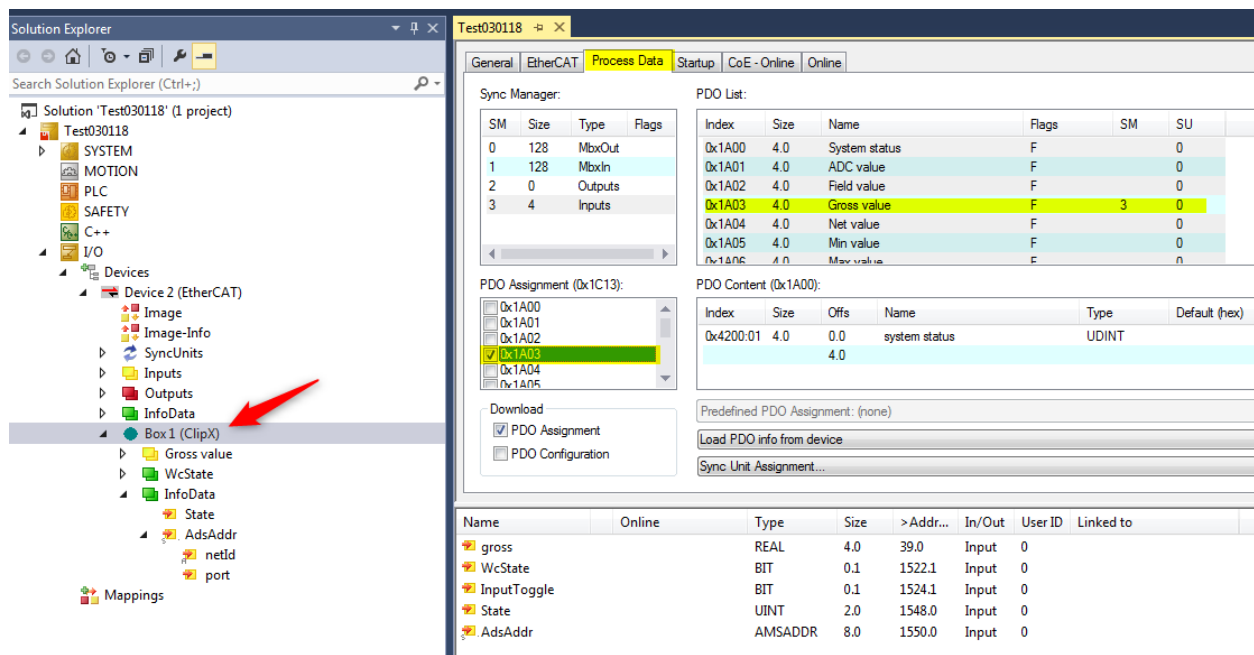
Confirm with OK



No Free Run. Because we have to assign some PDOs at first. PDOs like Measured Value, Status and so on.



Double click on ClipX, Process Data and assign PDOs, for example Gross value.



Solution Explorer

Search Solution Explorer (Ctrl+):

- Solution 'Test030118' (1 project)
 - Test030118
 - SYSTEM
 - MOTION
 - PLC
 - SAFETY
 - C++
 - I/O
 - Devices
 - Device 2 (EtherCAT)
 - Image
 - Image-Info
 - SyncUnits
 - Inputs
 - Outputs
 - InfoData
 - Box 1 (ClipX)
 - Gross value
 - WcState
 - InfoData
 - State
 - AdsAddr
 - netId
 - port

Test030118 - Process Data

General | EtherCAT | **Process Data** | Startup | CoE - Online | Online

Sync Manager:

| SM | Size | Type | Flags |
|----|------|---------|-------|
| 0 | 128 | MboxOut | |
| 1 | 128 | MboxIn | |
| 2 | 0 | Outputs | |
| 3 | 4 | Inputs | |

PDO List:

| Index | Size | Name | Flags | SM | SU |
|--------|------|---------------|-------|----|----|
| 0x1A00 | 4.0 | System status | F | | 0 |
| 0x1A01 | 4.0 | ADC value | F | | 0 |
| 0x1A02 | 4.0 | Field value | F | | 0 |
| 0x1A03 | 4.0 | Gross value | F | 3 | 0 |
| 0x1A04 | 4.0 | Net value | F | | 0 |
| 0x1A05 | 4.0 | Min value | F | | 0 |
| 0x1A06 | 4.0 | Max value | F | | 0 |

PDO Assignment (0x1C13):

- ☐ 0x1A00
- ☐ 0x1A01
- ☐ 0x1A02
- ☒ 0x1A03
- ☐ 0x1A04
- ☐ 0x1A05

PDO Content (0x1A00):

| Index | Size | Offs | Name | Type | Default (hex) |
|-----------|------|------|---------------|-------|---------------|
| 0x4200:01 | 4.0 | 0.0 | system status | UDINT | 4.0 |

Download

- ☒ PDO Assignment
- ☐ PDO Configuration

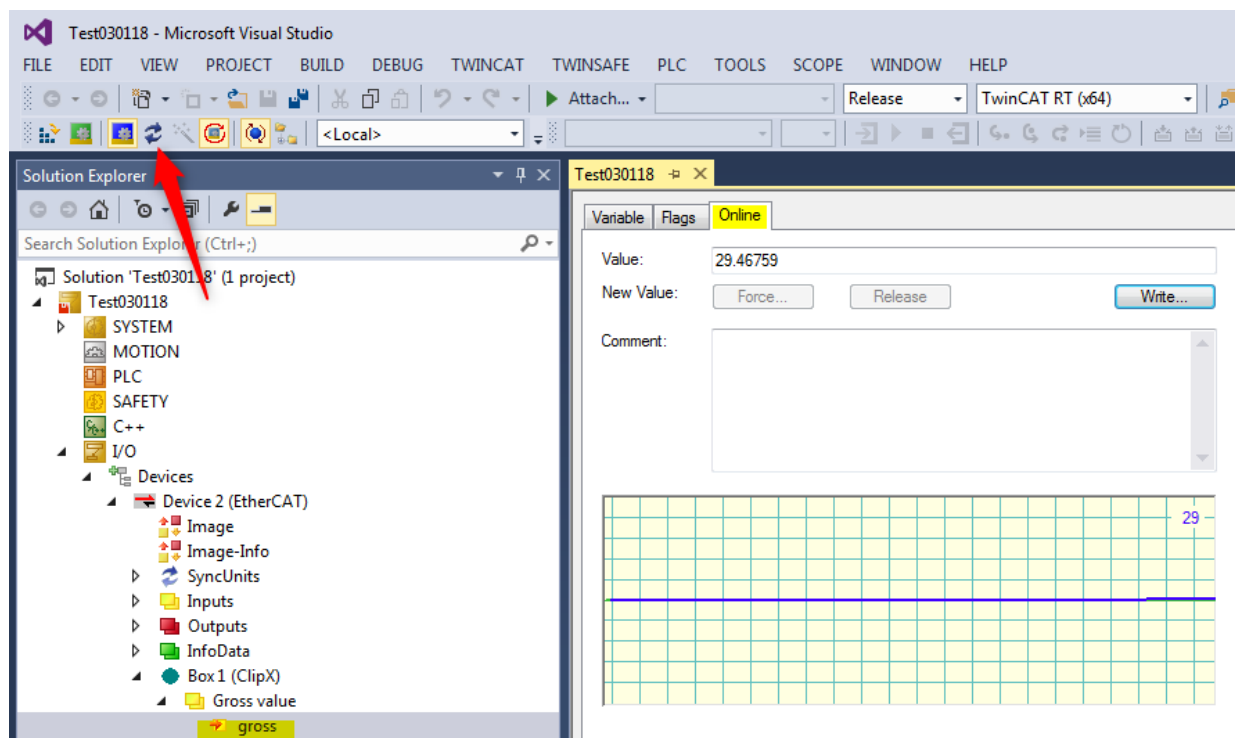
Predefined PDO Assignment: (none)

Load PDO info from device

Sync Unit Assignment...

| Name | Online | Type | Size | >Addr... | In/Out | User ID | Linked to |
|-------------|--------|---------|------|----------|--------|---------|-----------|
| gross | | REAL | 4.0 | 39.0 | Input | 0 | |
| WcState | | BIT | 0.1 | 1522.1 | Input | 0 | |
| InputToggle | | BIT | 0.1 | 1524.1 | Input | 0 | |
| State | | UINT | 2.0 | 1548.0 | Input | 0 | |
| AdsAddr | | AMSADDR | 8.0 | 1550.0 | Input | 0 | |

Reload devices and confirm Free Run. Now you should see a changing measured value.



Test030118 - Microsoft Visual Studio

FILE | EDIT | VIEW | PROJECT | BUILD | DEBUG | TWINCAT | TWINSAFE | PLC | TOOLS | SCOPE | WINDOW | HELP

Attach... | Release | TwinCAT RT (x64)

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 - C++
 - I/O
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 - Device 2 (EtherCAT)
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 - Image-Info
 - SyncUnits
 - Inputs
 - Outputs
 - InfoData
 - Box 1 (ClipX)
 - Gross value
 - gross

Test030118 - Scope

Variable | Flags | **Online**

Value: 29.46759

New Value: Force... Release Write...

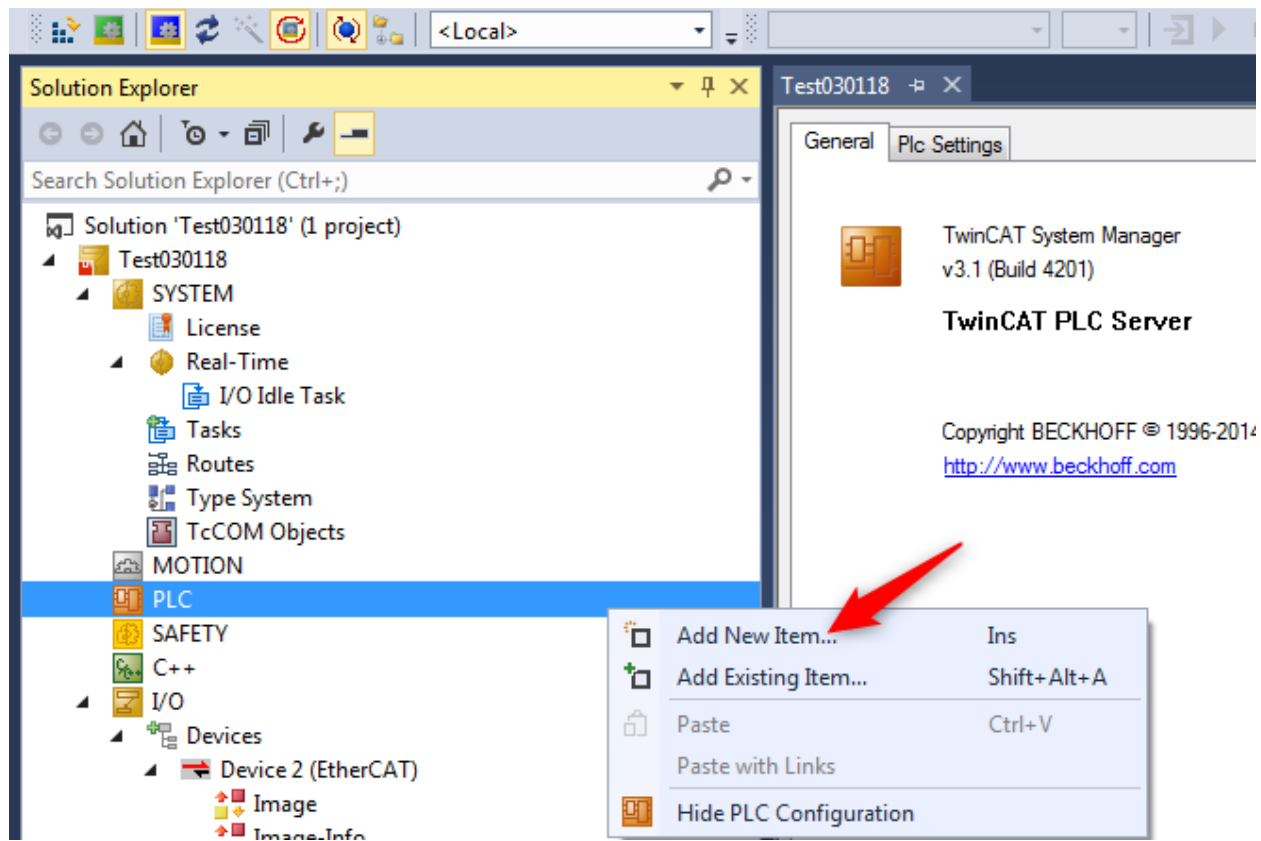
Comment:

29

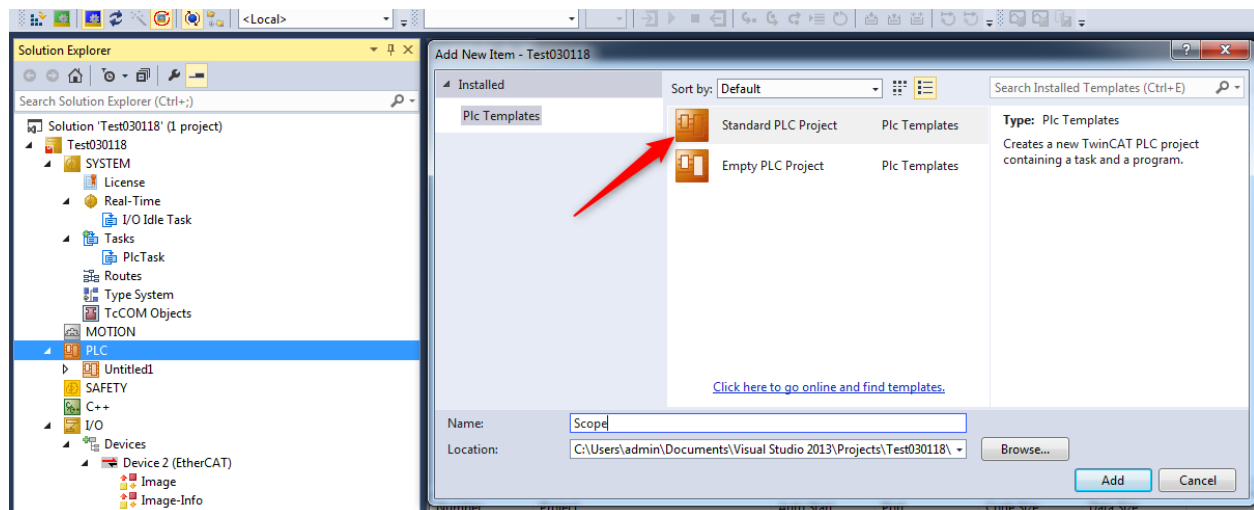
3 TwinCAT Scope

TwinCAT 3 offers a good possibility for visualize the mapped PDOs. In the following example we want verify the update rate from ClipX measured value.

Add via right mouse click on PLC, a new item.



Choose standard PLC Project.



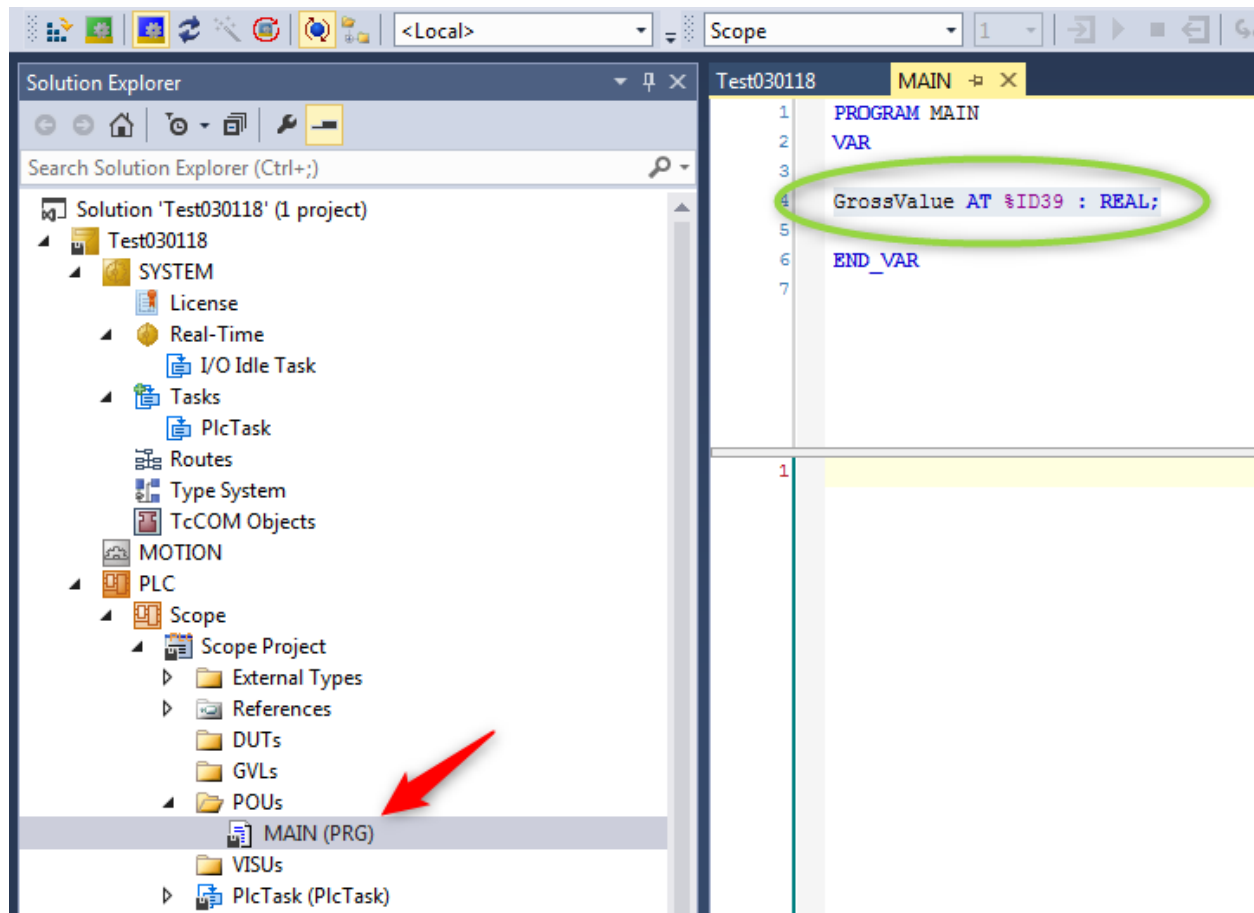
Define variable like GrossValue AT %ID39 : REAL;

GrossValue : variable name

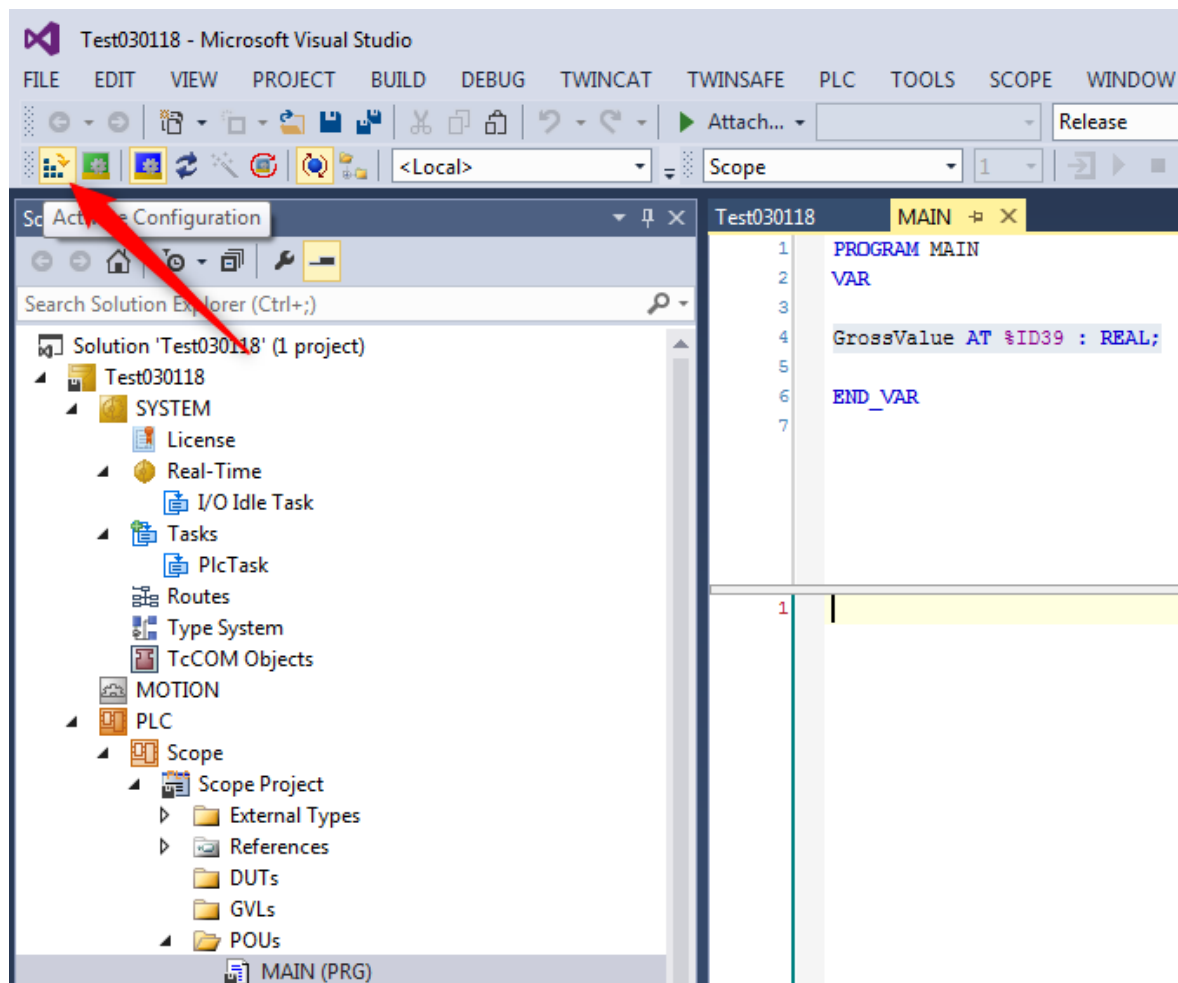
AT %ID39 : Input, 4 byte, address 39

REAL : data format

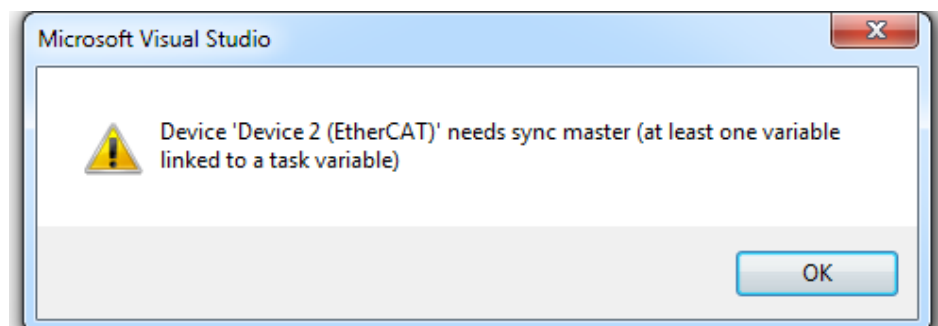
How should I know that? -> Explanation page 12.



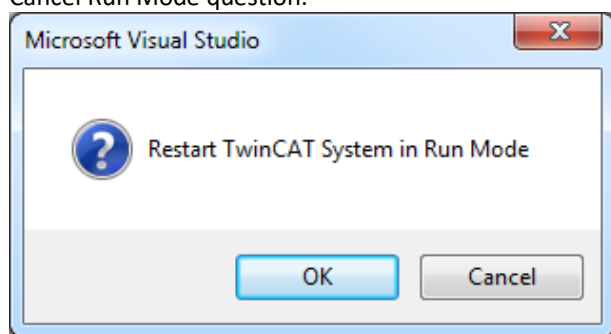
Activate configuration.



Not wondering about following message. It will be corrected in the next steps.

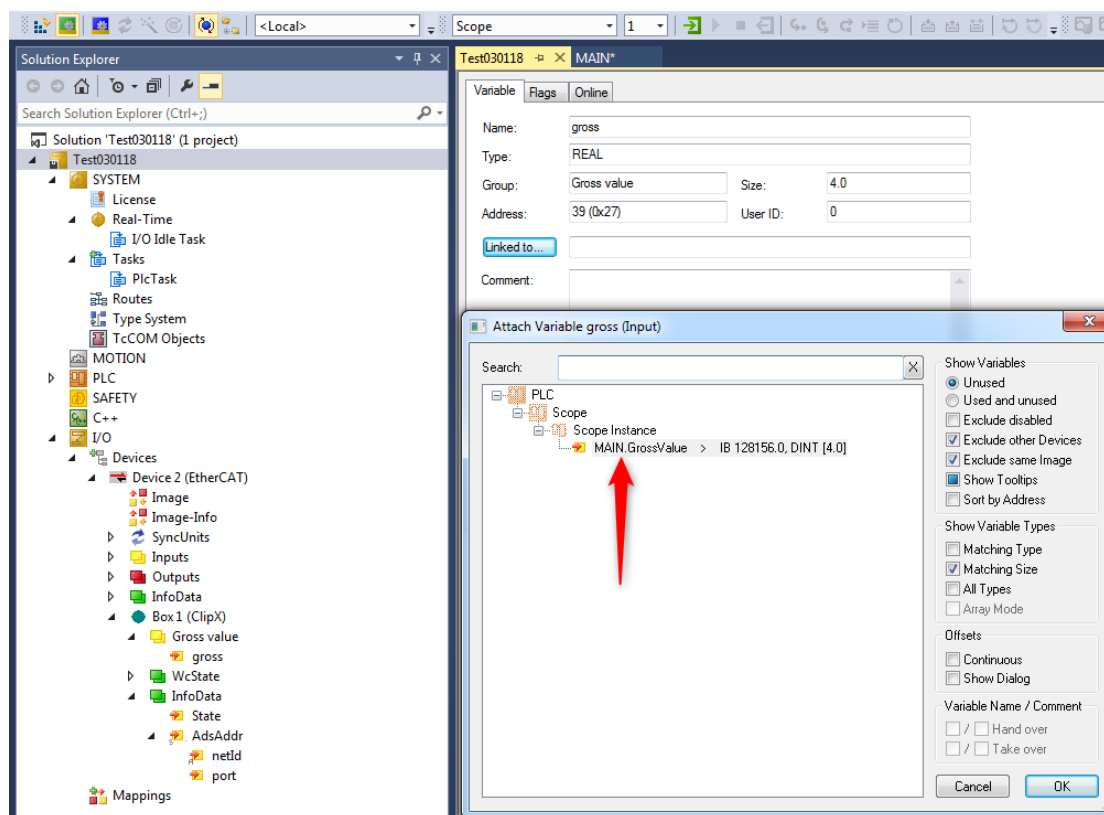
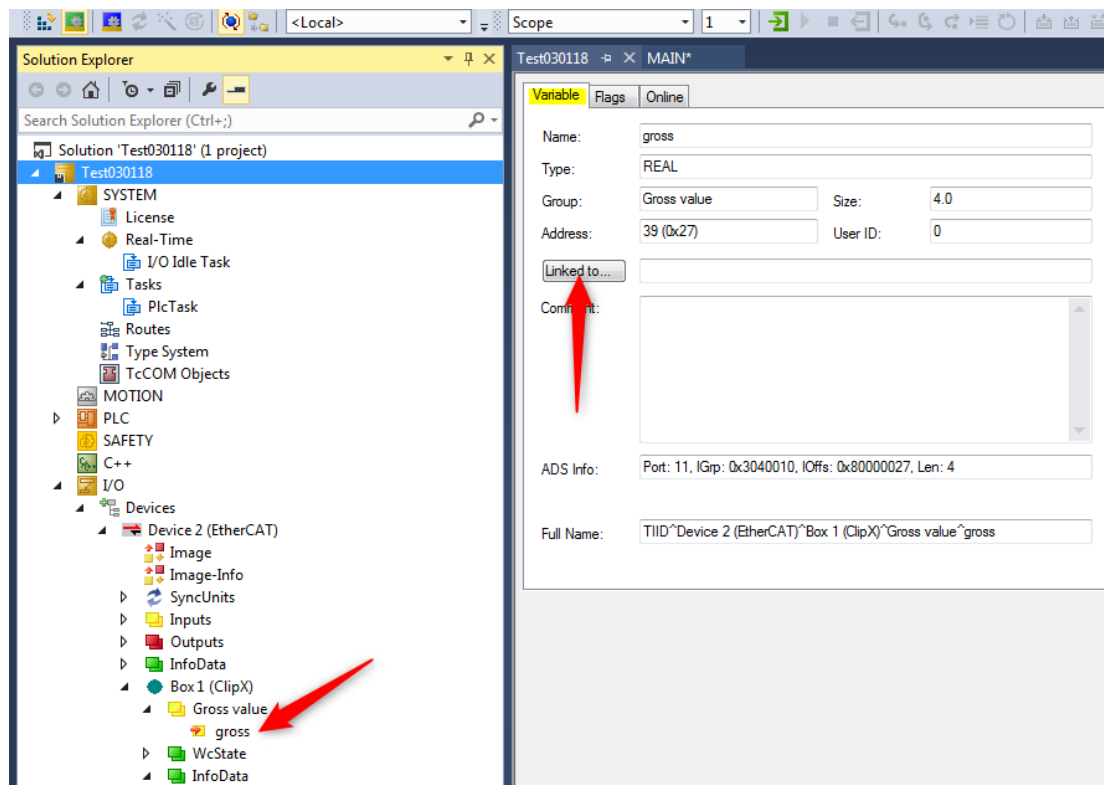


Cancel Run Mode question.

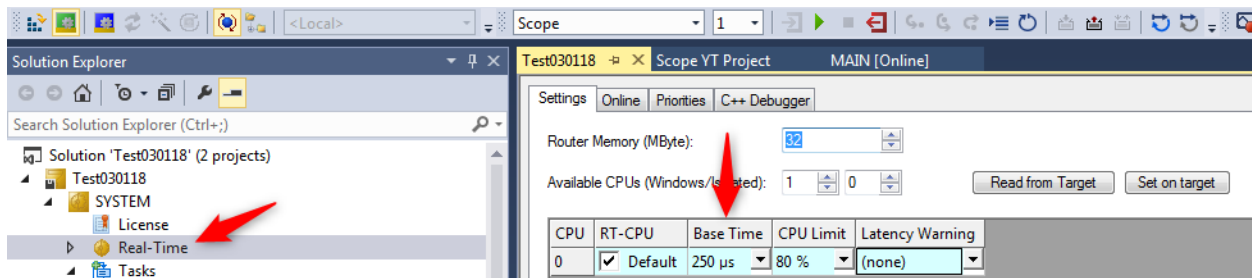


Assign ClipX Gross Value to your pre define variable.

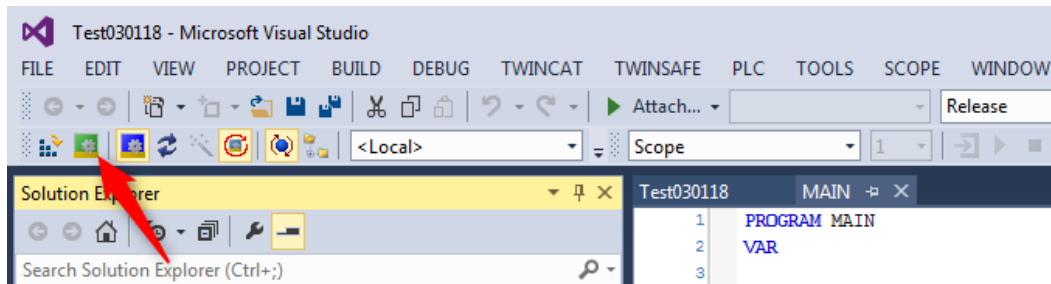
Look to the ClipX Gross value properties. Address 39, format REAL.



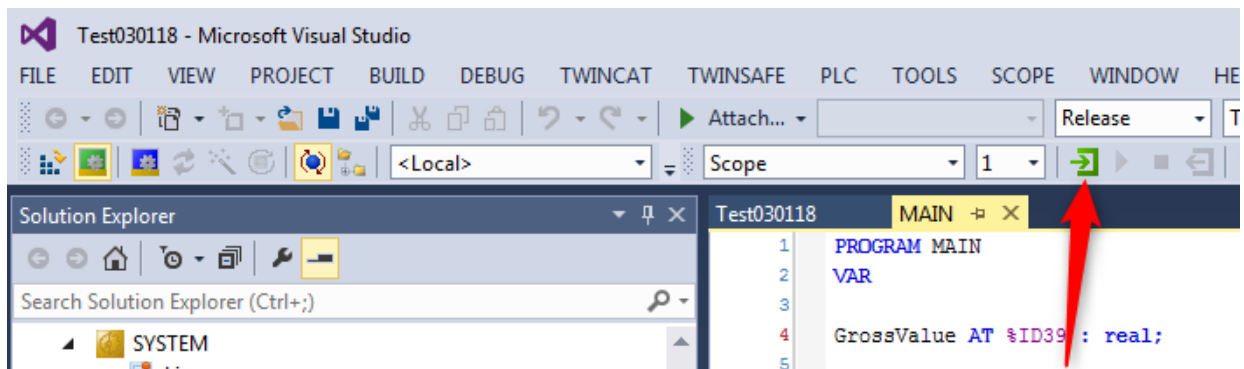
ClipX is able to run up to 4kHz. Means for check this rate we have to set the PLC base time to 250µs.



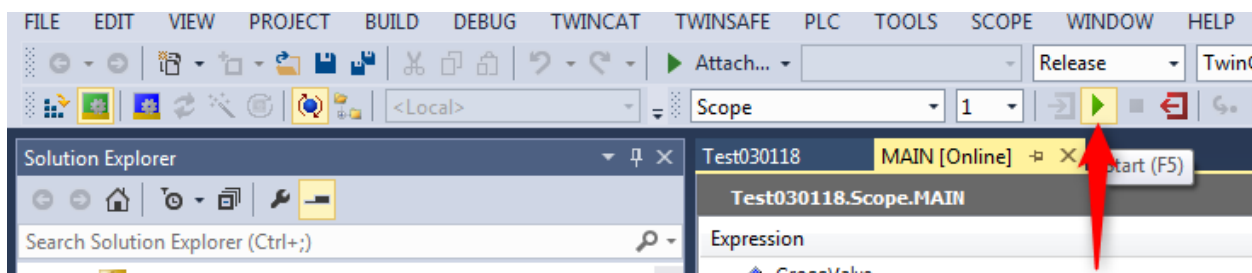
Activate Run Mode



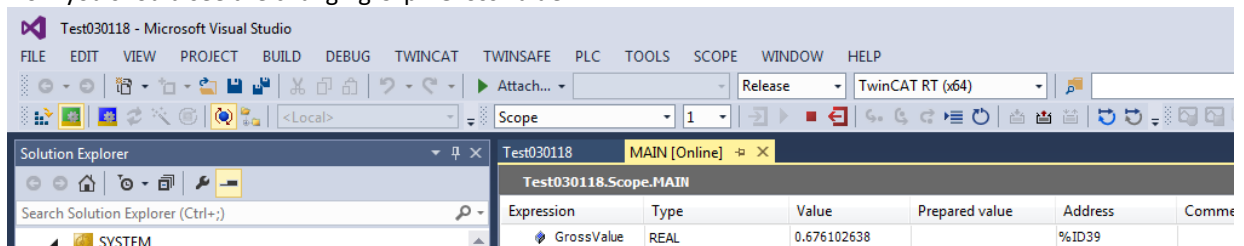
Login



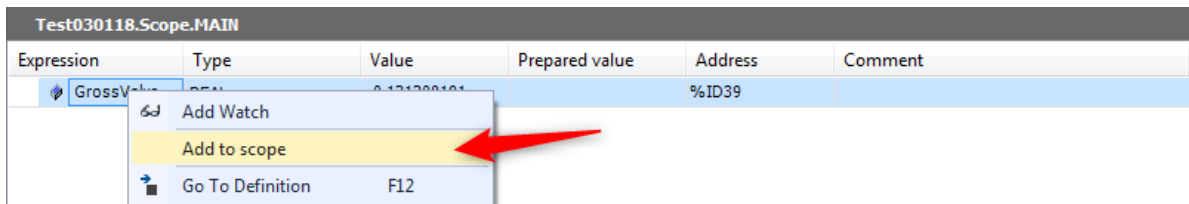
Start the PLC



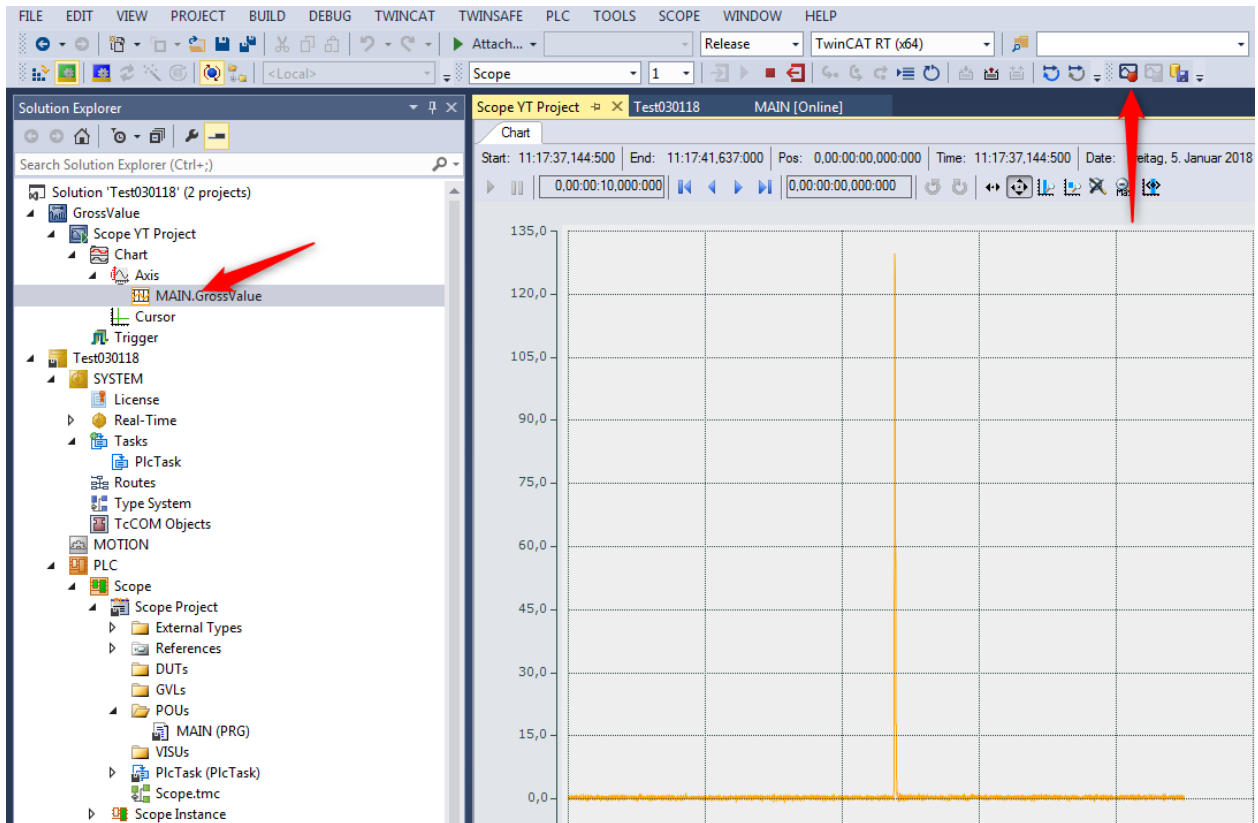
Now you should see the changing ClipX Gross value.



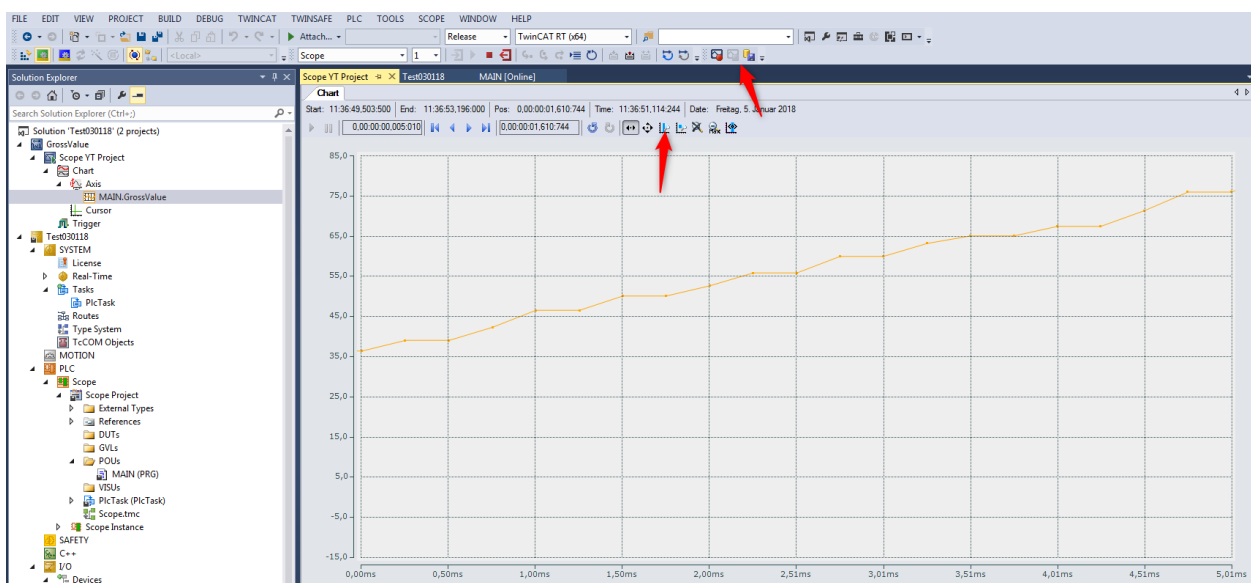
To use the Scope Functionality, right mouse click on the value, add to scope.



Start the monitoring and give a soft punch on the force transducer.



Stop the monitoring and zoom in at the peak as long you need for verification from 4kHz, 250µs.



Disclaimer

These examples are for illustrative purposes only. They cannot be used as the basis for any warranty or liability claims.