

# Tutorial

## TwinCAT 3 & EtherCAT Voegtlin Devices

*red-y Industrial series*

*red-y smart series*



Version: Tutorial TwinCAT/Voegtlin

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**Tutorial:**  
**TwinCAT 3 & EtherCAT Voegtlin Devices**

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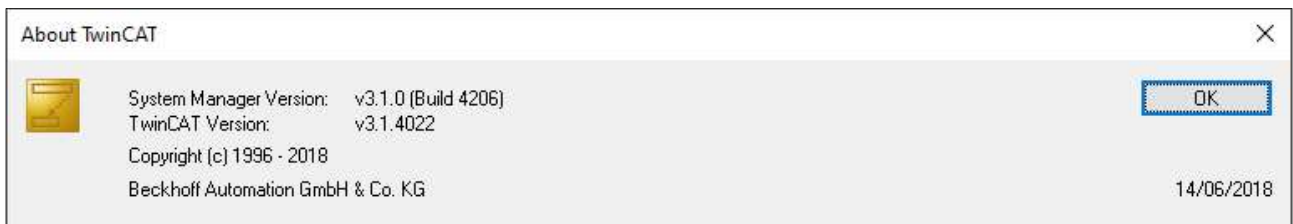
# Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

## TwinCAT 3 EtherCAT Tutorial

This tutorial will describe how a Voegtlin EtherCAT device can be added to a TwinCAT soft PLC. The tutorial will start from scratch, it does not describe how to install TwinCAT.

Remark: The created project in this tutorial can be downloaded from Voegtlin homepage, under file name:  
*Project Files EtherCAT v1.01 to open in TwinCAT - Tutorial v1.4.ZIP*

The following version of TwinCAT is used in this tutorial:



## Add ESI to TwinCAT

In order to be able to use the Voegtlin device with TwinCAT, it is essential that the ESI is stored. The ESI file needs to be stored in the following location on the target PC:

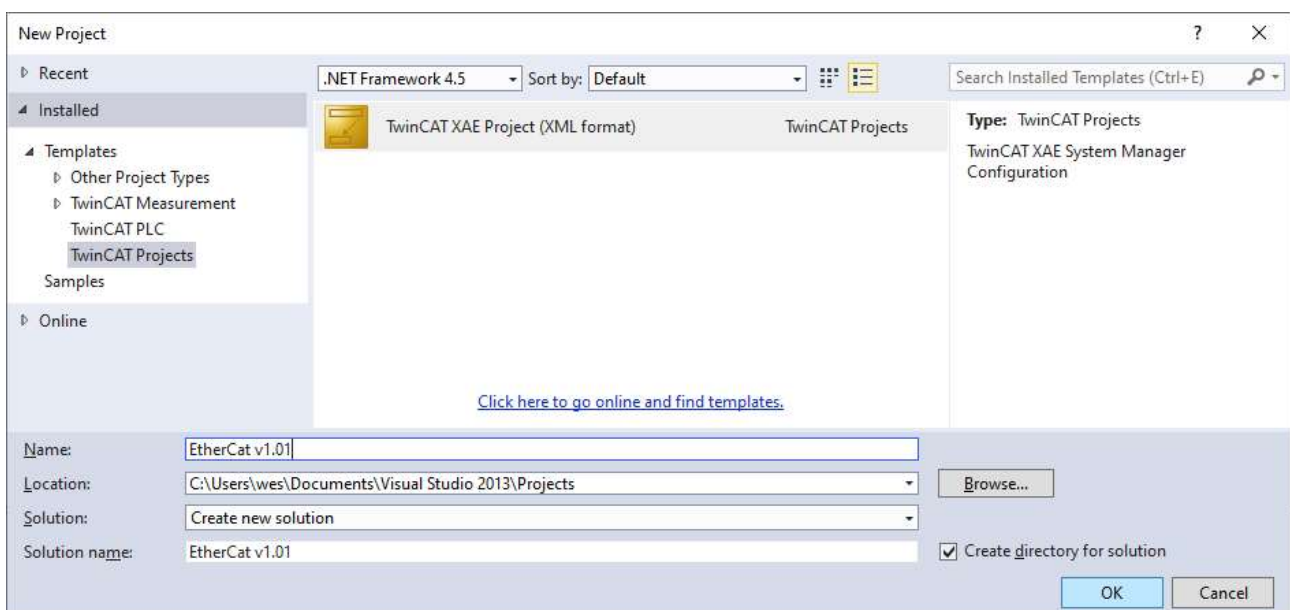
..\TwinCAT\3.1\Config\Io\EtherCAT\

The ESI has the following file name: ESI\_Voegtlin\_Instruments\_0B02\_Red-y\_V1.02.xml

*Note: Check the website for possible updates of the ESI file*

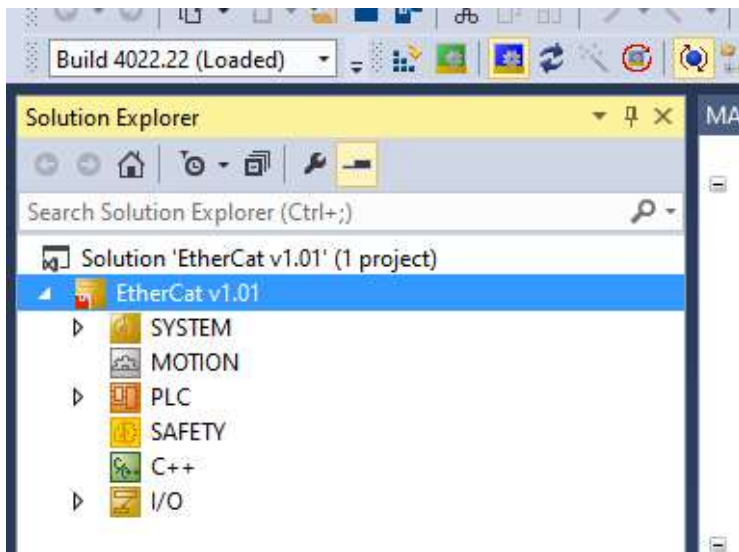
## Create Project

Start TwinCAT and from the file menu start a new project. In the dialog box give the project a name. Select the location where to store the project and press OK:



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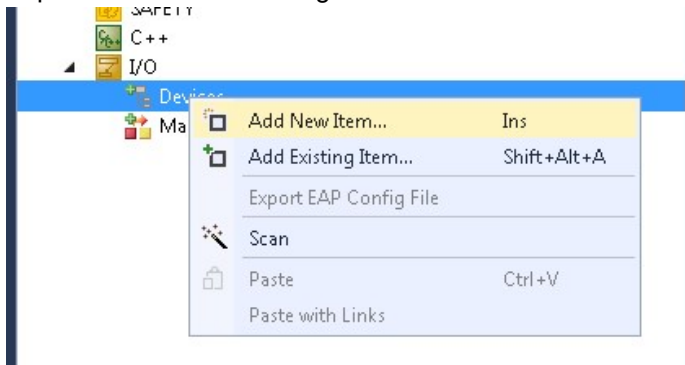
In the solution explorer (left side), only SYSTEM, PLC and I/O will be used. The other items can be switched off through the right mouse button context menu:



*Note: In this tutorial MOTION, SAFETY and C++ will be hidden.*

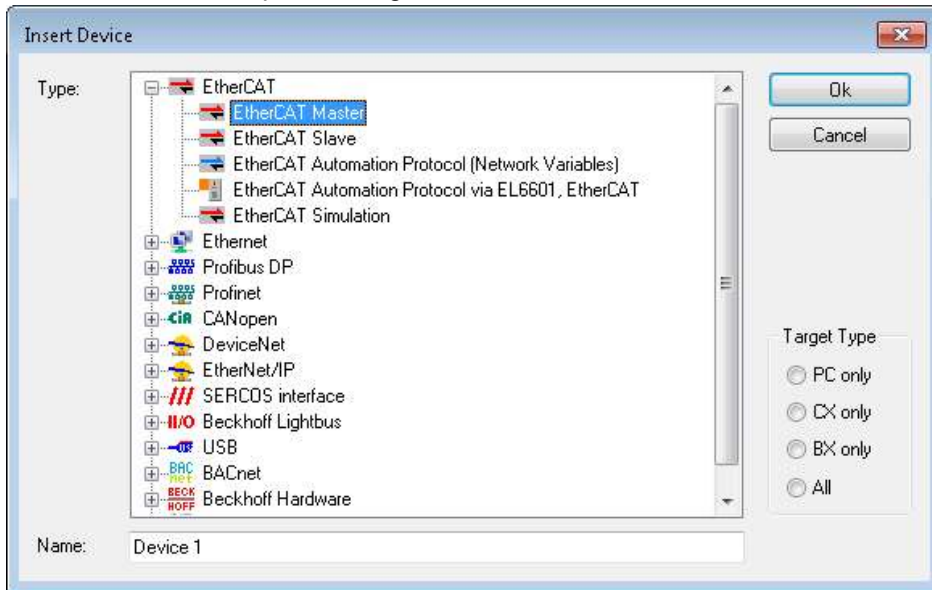
### Add EtherCAT server

Expand the I/O item and right click on the devices item. Add a new item:



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From the list which is presented go to the EtherCAT list and select the EtherCAT Master:

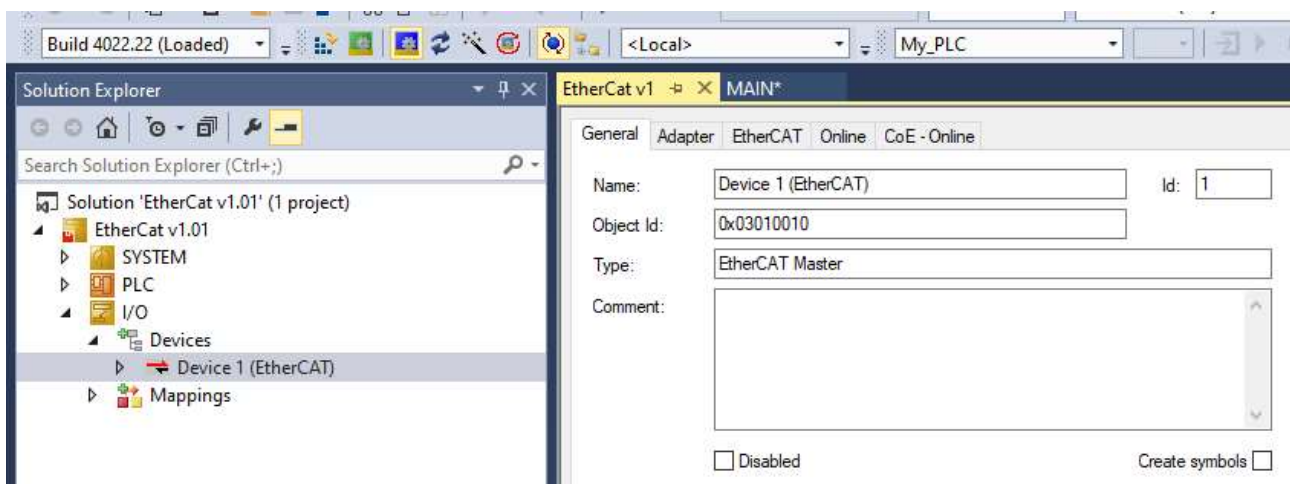


### Add Ethernet port

The EtherCAT controller needs an active Ethernet port in order to work. In this tutorial the USB Ethernet dongle, DUB-E100 from D-Link, will be used as main adapter for TwinCAT.



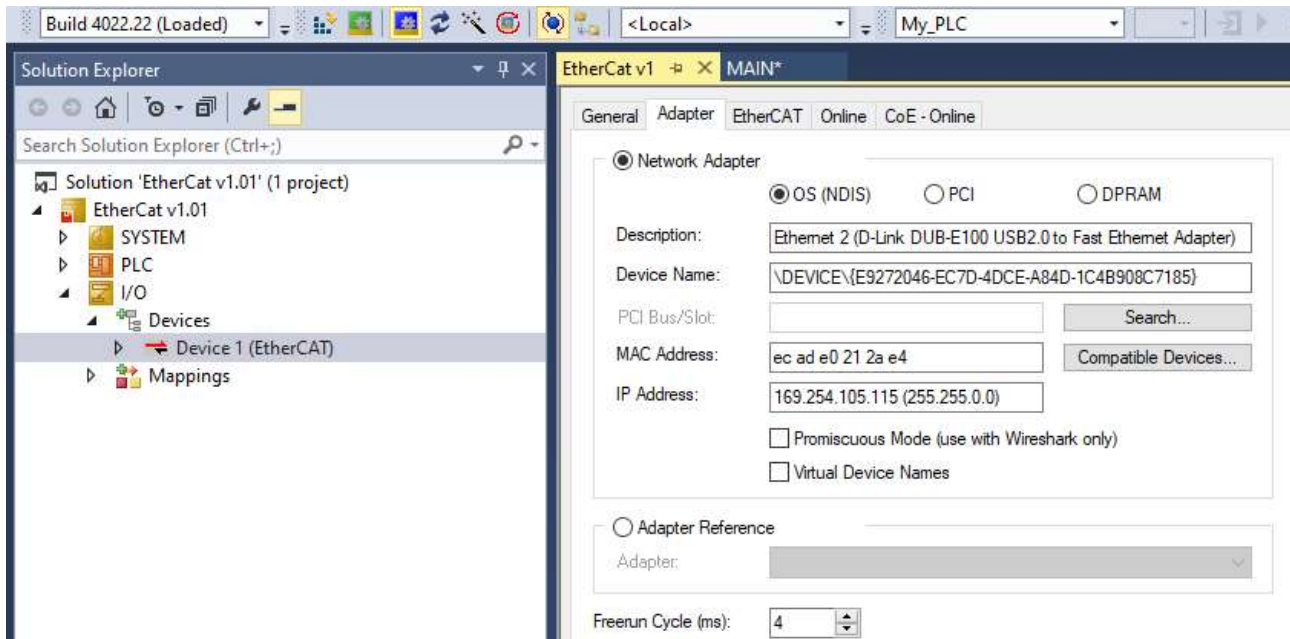
Double click on the controller to open the properties:



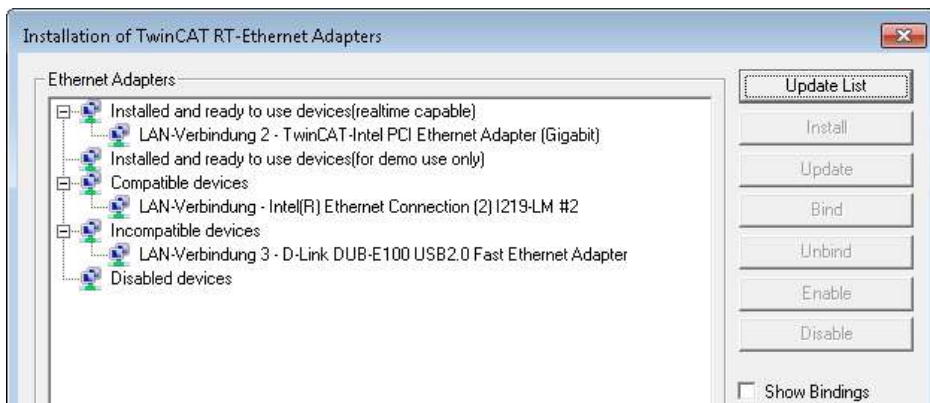
Go to the “Adapter” tab.

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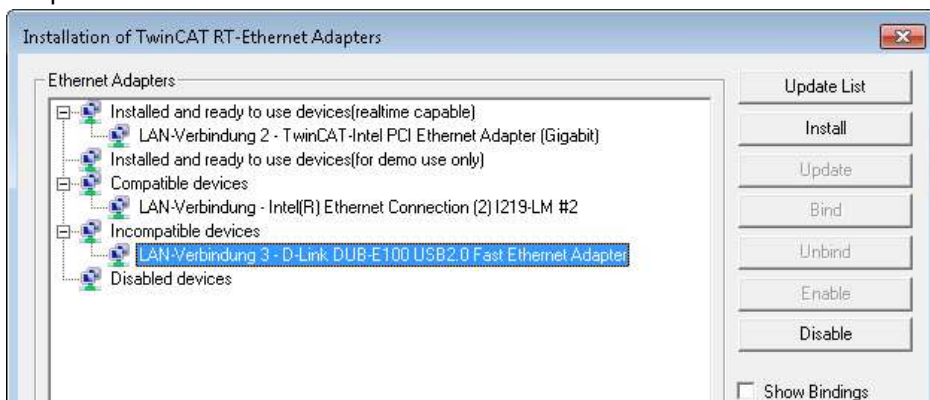
Here a suitable Ethernet adapter can be selected:



If no adapter is selected click on the “Compatible Devices” button to get an overview of all available adapters:

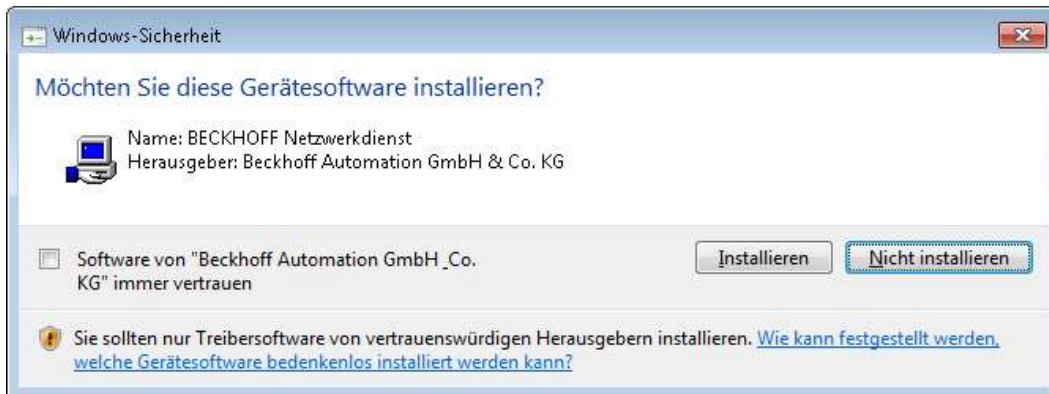


Here an adapter can be selected. Click on the adapter and then click on the “Install” button to prepare the adapter:



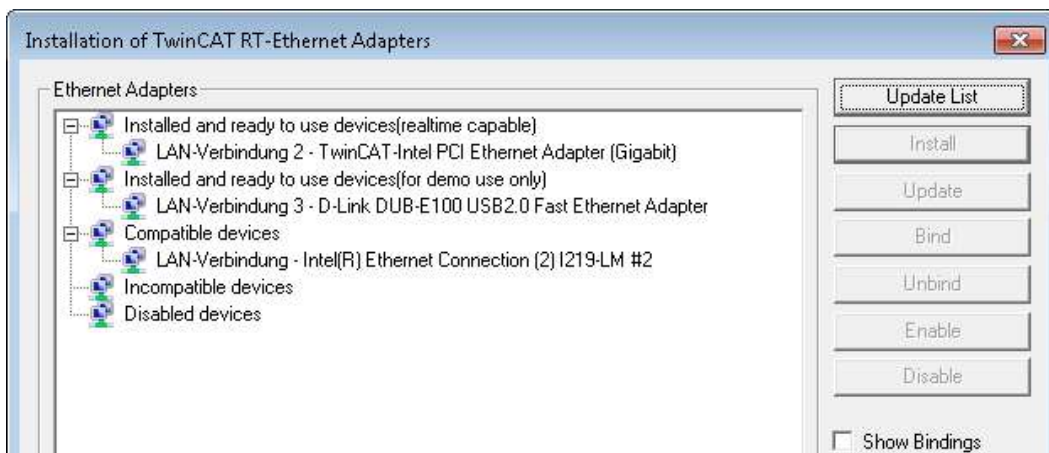
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A pop-up may appear asking to install the Beckhoff driver:

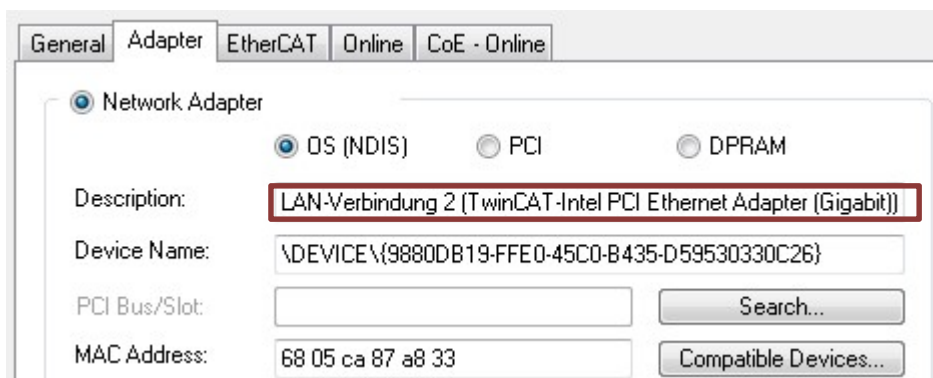


Press "Install" when ok.

After the installation the list should show all the installed adapters:



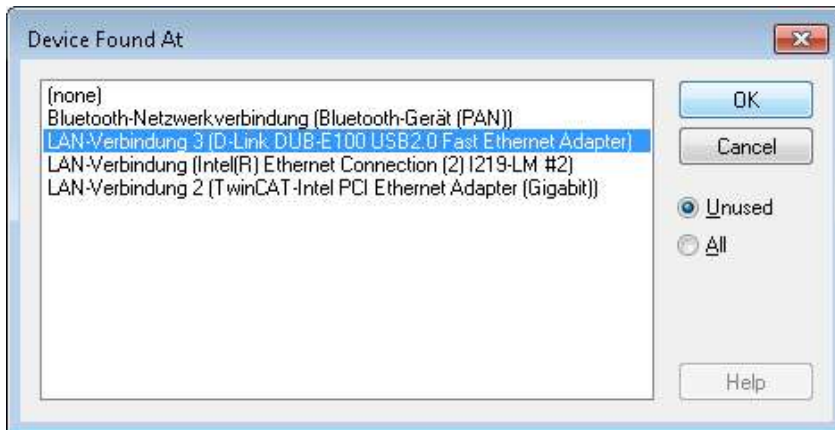
Close the window. Check if the desired Ethernet adapter is shown under the description:





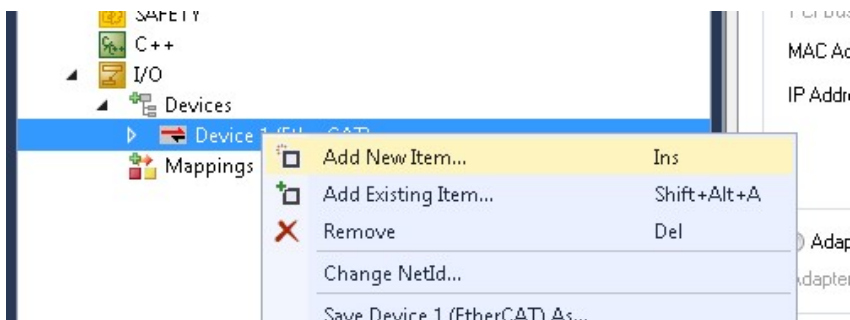
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If not then press the “Search” button and select the desired adapter:



### Add Voegtlin device

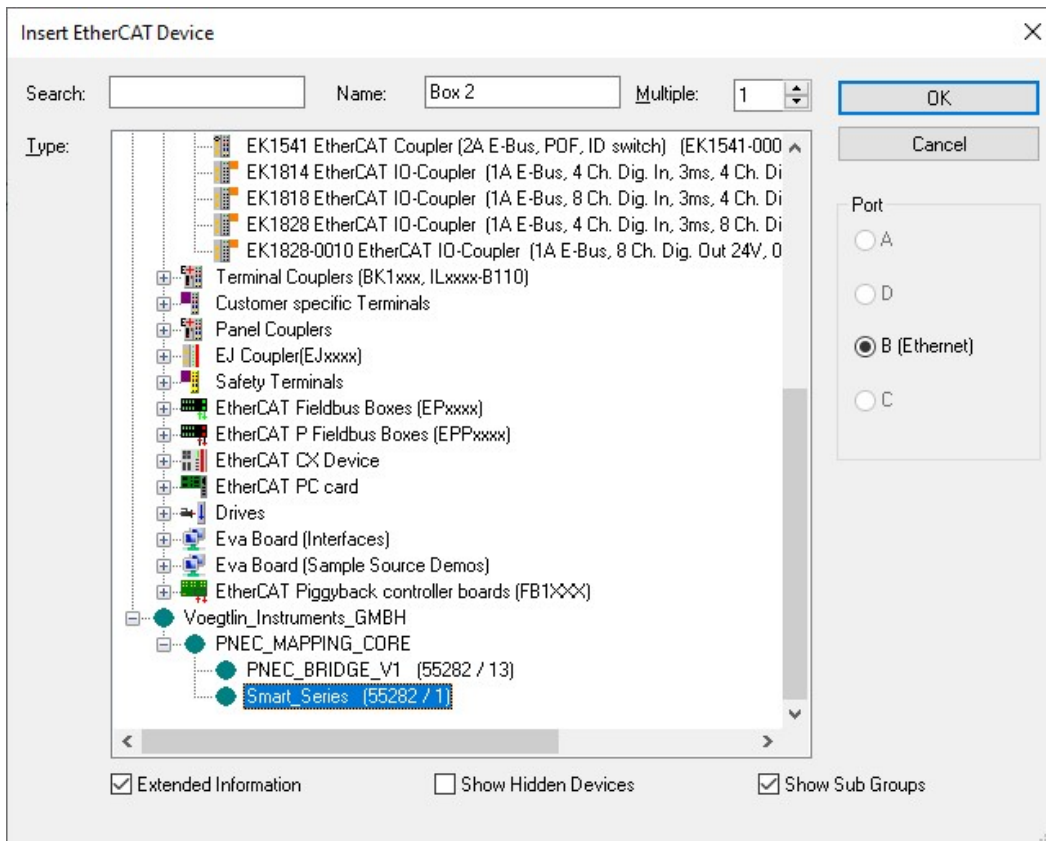
Right click on the EtherCAT Controller and from the context menu select “New Item”:



Find the Voegtlin device in the list and select it:



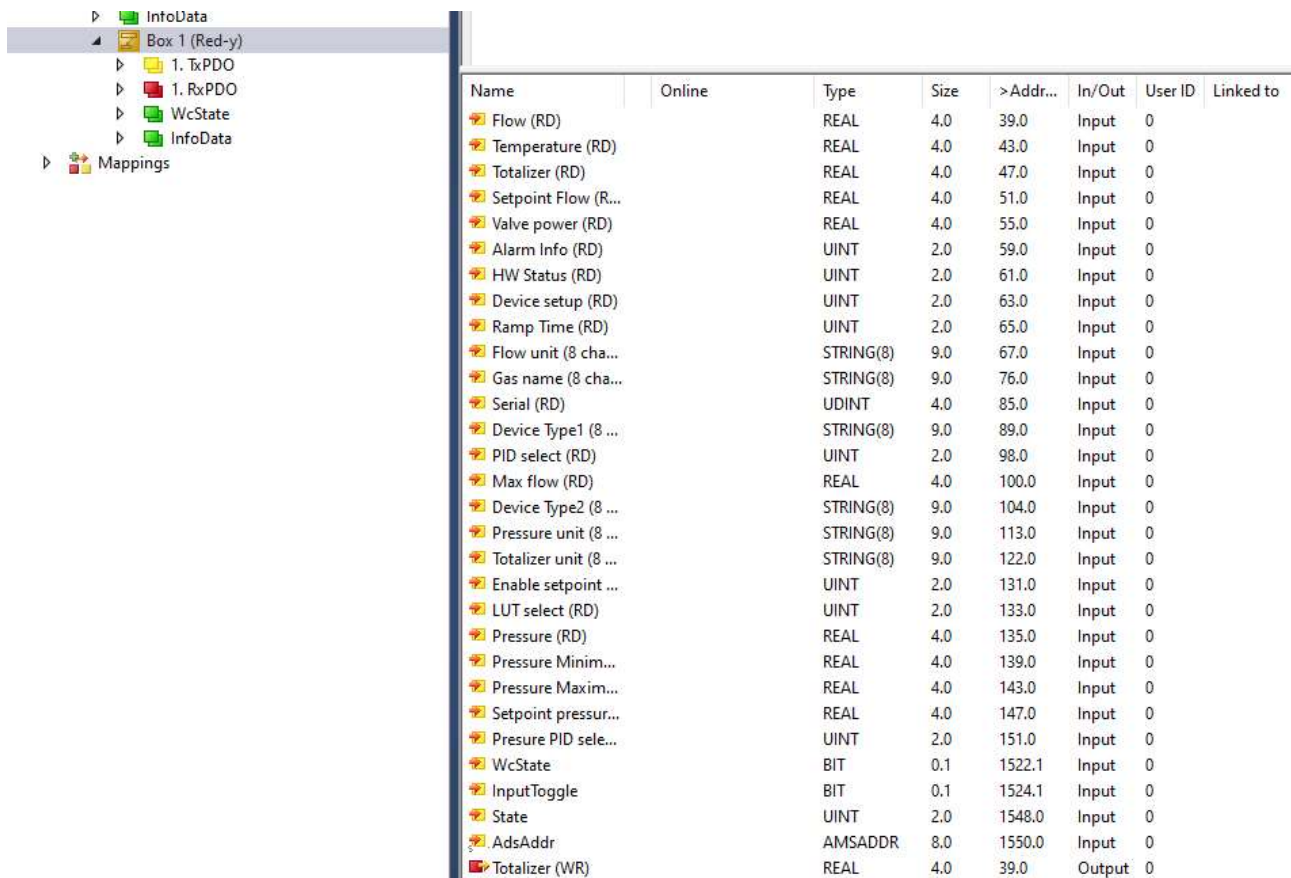
## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices



In this example the following ESI file is used:  
ESI\_Voegtlin\_Instruments\_0B02\_Red-y\_V1.01.xml

## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

Double click on “Box1 (PNEC\_BRIDGE)” to get an overview of all the available registers:



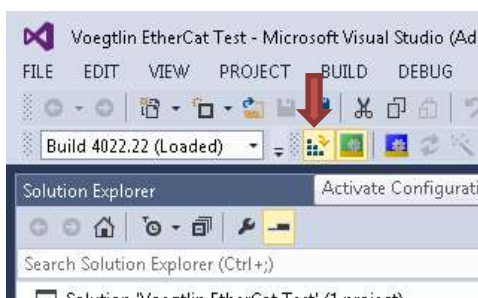
The screenshot shows the TwinCAT 3 configuration interface. On the left, a tree view displays the configuration structure: 'InfoData' (expanded) contains 'Box 1 (Red-y)' (expanded), which includes '1. TxPDO', '1. RxPDO', 'WcState', and 'InfoData'. Below this is a 'Mappings' section. The main area on the right displays a table of available registers for 'Box 1 (Red-y)'.

Name	Online	Type	Size	> Addr...	In/Out	User ID	Linked to
Flow (RD)		REAL	4.0	39.0	Input	0	
Temperature (RD)		REAL	4.0	43.0	Input	0	
Totalizer (RD)		REAL	4.0	47.0	Input	0	
Setpoint Flow (R...		REAL	4.0	51.0	Input	0	
Valve power (RD)		REAL	4.0	55.0	Input	0	
Alarm Info (RD)		UINT	2.0	59.0	Input	0	
HW Status (RD)		UINT	2.0	61.0	Input	0	
Device setup (RD)		UINT	2.0	63.0	Input	0	
Ramp Time (RD)		UINT	2.0	65.0	Input	0	
Flow unit (8 cha...		STRING(8)	9.0	67.0	Input	0	
Gas name (8 cha...		STRING(8)	9.0	76.0	Input	0	
Serial (RD)		UDINT	4.0	85.0	Input	0	
Device Type1 (8 ...		STRING(8)	9.0	89.0	Input	0	
PID select (RD)		UINT	2.0	98.0	Input	0	
Max flow (RD)		REAL	4.0	100.0	Input	0	
Device Type2 (8 ...		STRING(8)	9.0	104.0	Input	0	
Pressure unit (8 ...		STRING(8)	9.0	113.0	Input	0	
Totalizer unit (8 ...		STRING(8)	9.0	122.0	Input	0	
Enable setpoint ...		UINT	2.0	131.0	Input	0	
LUT select (RD)		UINT	2.0	133.0	Input	0	
Pressure (RD)		REAL	4.0	135.0	Input	0	
Pressure Minim...		REAL	4.0	139.0	Input	0	
Pressure Maxim...		REAL	4.0	143.0	Input	0	
Setpoint pressur...		REAL	4.0	147.0	Input	0	
Pressure PID sele...		UINT	2.0	151.0	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	
Totalizer (WR)		REAL	4.0	39.0	Output	0	

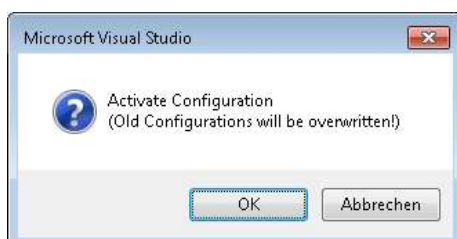
Save the project.

## Starting the PLC

Activate the created configuration by pressing the “Activate Configuration” button:

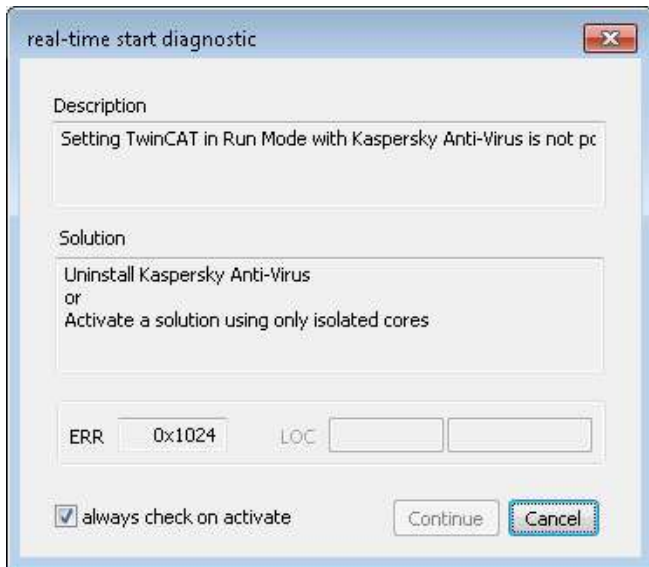


A window will pop-up to confirm the action, proceed:



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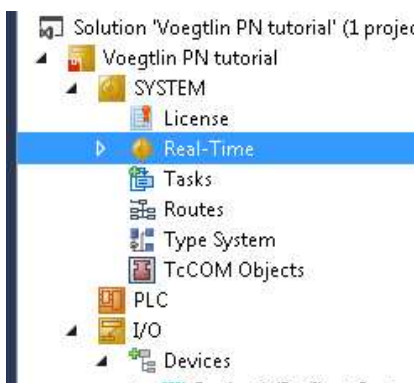
It is possible to receive the following error:



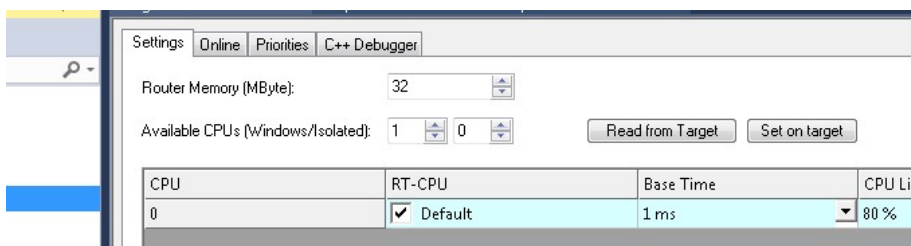
To solve this problem either uninstall the virus checker or assign a core to the PLC.

### Assign Core

Expand the SYSTEM item and double click on the “Real Time” item:



In the new window press the “Read from Target” button to get the current configuration:



The actual core setup will be shown. On the machine where the tutorial runs, one core is assigned to the PLC:

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Settings | Online | Priorities | C++ Debugger

Router Memory (MByte): 32

Available CPUs (Windows/Isolated): 7 1 Read from Target Set on target

CPU	RT-CPU	Base Time	CPU Limit	Latency Warning
0 (Windows)	<input checked="" type="checkbox"/> Default	1 ms	80 %	(none)
1 (Windows)	<input type="checkbox"/>			
2 (Windows)	<input type="checkbox"/>			
3 (Windows)	<input type="checkbox"/>			
4 (Windows)	<input type="checkbox"/>			
5 (Windows)	<input type="checkbox"/>			
6 (Windows)	<input type="checkbox"/>			
7 (Isolated)	<input type="checkbox"/>			

Object	RT-CPU	Base Time (ms)	Cycle Time (ms)	Cycle Ticks	Priority
I/O Idle Task	Default (0)	1 ms	1 ms	1	11

The numbers of cores can be set by pressing the “Set on Target” button.  
Assign the PLC to the isolated core by setting the check box (uncheck the default core):

Settings | Online | Priorities | C++ Debugger

Router Memory (MByte): 32

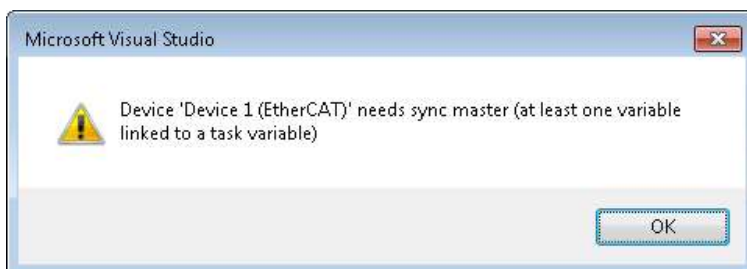
Available CPUs (Windows/Isolated): 7 1 Read from Target Set on target

CPU	RT-CPU	Base Time	CPU Limit	Latency Warning
0 (Windows)	<input type="checkbox"/>			
1 (Windows)	<input type="checkbox"/>			
2 (Windows)	<input type="checkbox"/>			
3 (Windows)	<input type="checkbox"/>			
4 (Windows)	<input type="checkbox"/>			
5 (Windows)	<input type="checkbox"/>			
6 (Windows)	<input type="checkbox"/>			
7 (Isolated)	<input checked="" type="checkbox"/> Default	1 ms	100 %	(none)

Object	RT-CPU	Base Time (ms)	Cycle Time (ms)	Cycle Ticks	Priority
I/O Idle Task	Default (7)	1 ms	1 ms	1	11

Activate the created configuration again. A new pop-up will appear informing that a sync master is needed. This can be ignored (for now):



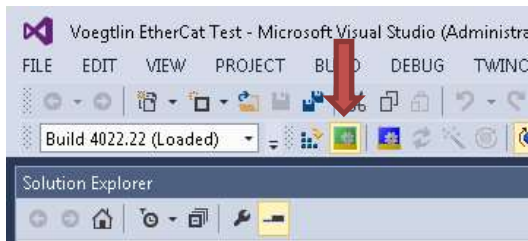
Press “OK”

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Press “OK”

The PLC is running now which can be seen by the TwinCAT System indicator turning green:



At this stage it might be that the Device isn't online because the TwinCAT I/O system has not been linked to another device that can drive the I/O. See appendix A for a solution.

To view data from the device when it is not online, switched to “Config mode”. Press the blue button right next to the TwinCAT System indicator.

A pop-up window appears asking to confirm the action, confirm:



Press “OK”



Press “Yes”

To see live data, double click on “Box 1 (Red-y-for-gasflow)”:

# Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

My\_PLC Instance

I/O

Devices

Device 1 (EtherCAT)

Image

Image-Info

SyncUnits

Inputs

Outputs

InfoData

Box 1 (Red-y)

1. TxPDO

1. RxPDO

WcState

InfoData

Mappings

Name	Online	Type	Size	>Addr...	In/Out	User ID
Flow (RD)	0.0031449015	REAL	4.0	39.0	Input	0
Temperature (RD)	24.414848	REAL	4.0	43.0	Input	0
Totalizer (RD)	95.803459	REAL	4.0	47.0	Input	0
Setpoint Flow (RD)	0.0	REAL	4.0	51.0	Input	0
Valve power (RD)	0.0	REAL	4.0	55.0	Input	0
Alarm Info (RD)	0	UINT	2.0	59.0	Input	0
HW Status (RD)	0	UINT	2.0	61.0	Input	0
Device setup (RD)	5	UINT	2.0	63.0	Input	0
Ramp Time (RD)	0	UINT	2.0	65.0	Input	0
Flow unit (8 characters) (RD)		STRING(8)	9.0	67.0	Input	0
Gas name (8 characters) (RD)		STRING(8)	9.0	76.0	Input	0
Serial (RD)	163194	UDINT	4.0	85.0	Input	0
Device Type1 (8 characters) (RD)		STRING(8)	9.0	89.0	Input	0
PID select (RD)	0	UINT	2.0	98.0	Input	0
Max flow (RD)	60.0	REAL	4.0	100.0	Input	0
Device Type2 (8 characters) (RD)		STRING(8)	9.0	104.0	Input	0
Pressure unit (8 characters) (RD)		STRING(8)	9.0	113.0	Input	0
Totalizer unit (8 characters) (RD)		STRING(8)	9.0	122.0	Input	0
Enable setpoint storage (RD)	0	UINT	2.0	131.0	Input	0
LUT select (RD)	2	UINT	2.0	133.0	Input	0
Pressure (RD)	0.0	REAL	4.0	135.0	Input	0
Pressure Minimum(RD)	0.0	REAL	4.0	139.0	Input	0
Pressure Maximum(RD)	6.0	REAL	4.0	143.0	Input	0
Setpoint pressure (RD)	0.0	REAL	4.0	147.0	Input	0
Presure PID select (RD)	2	UINT	2.0	151.0	Input	0

## Writing data

At power-up the output PDO's are disabled. This means that any changes to the output PDO will not be executed by the Smart. In order to enable writing to the Smart, it is necessary to write PDO register "Write Select (WR)". Each bit in this register corresponds to a specific register.

The table below gives an overview:

Bit	Selected output PDO register
0	Totalizer
1	Set point Flow
2	Valve Power
3	Device Setup
4	Ramp Time
5	PID Select
6	Factory Reset
7	HW Error Reset
8	Enable SP Storage
9	LUT Select
10	Set Point Pressure
11	Pressure PID select
12	Soft Reset

Once a bit is set it will remain set until cleared again. The bits could be set during start-up of the program.

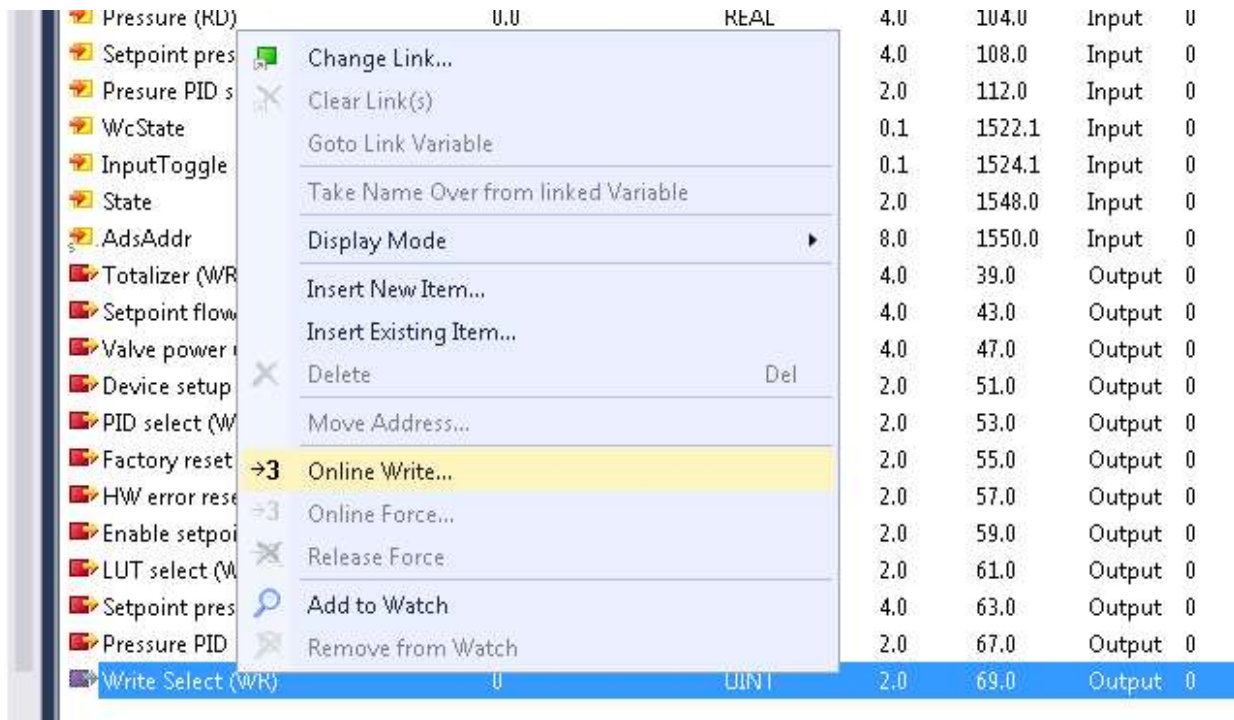


# Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

## Examples

### Writing a set point

To write a set point, bit 1 in the “Write Select (WR)” needs to be set. In the middle screen, right click on the red “Write Select (WR)” register and select “Online write”:



A dialog box will appear where a value can be entered in various formats. Set point is bit1 which means that the value “2” needs to be entered:



Press “OK”. The register is updated and now a set point can be written. Right click on the red “Setpoint Flow (WR)” register and in the dialog box enter a value (float). The maximum allowed flow for the connected controller in this tutorial is 60 l/min:



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Flow unit (8 characters) (RD)	In/min	STRING(8)
Gas name (8 characters) (RD)	Air	STRING(8)
Serial (RD)	163194	UDINT
PID select (RD)	0	UINT
Max flow (RD)	60.0	REAL

A value of 22.5 will be entered:

The 'Set Value Dialog' window is shown with the following fields:

- Dec: 1102315520
- Hex: 0x41B40000
- Float: 22.5
- Bool: 0 (selected), 1
- Binary: 00 00 B4 41
- Bit Size: 1, 8, 16, 32 (selected), 64, ?

Buttons: OK, Cancel, Hex Edit...

The set point is now set and can be checked:

Setpoint Flow (RD)	22.5	REAL
Valve power (RD)	100.0	REAL

The valve power is at 100% and an error has been raised (HW Status). This means there is no flow which is correct since the controller isn't connected to a gas supply.

HW Status (RD)	8	UINT	2.0	61.0	Input	0
Device setup (RD)	0	UINT	2.0	63.0	Input	0

Set point can be set to zero again:

The 'Set Value Dialog' window is shown with the following fields:

- Dec: 0
- Hex: 0x00000000
- Float: 0
- Bool: 0 (selected), 1
- Binary: 00 00 00 00
- Bit Size: 1, 8, 16, 32 (selected), 64, ?

Buttons: OK, Cancel, Hex Edit...

## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

### Clear HW error

To clear the error the “HW error reset (WR)” register needs to be written. To do so bit 7 of the “Write Select (WR)” register needs to be set. Bit 6 represents a value of  $2^7 = 128$ . Together with the set point the value  $128 + 2 = 130$  will be written in the register:

The 'Set Value Dialog' box is shown with the following values:

- Dec: 130
- Hex: 0x0082
- Float: (empty)
- Bool: 0 and 1 buttons, Hex Edit... button
- Binary: 82 00, 2
- Bit Size: 1, 8, 16 (selected), 32, 64, ?

To clear the error the same value as indicated must be written back. In this case 8:

HW Status (RD)	8	UINT	2.0	61.0	Input	0
Device setup (RD)	0	UINT	2.0	63.0	Input	0

Open the dialog box and enter the value 8, press “OK”:

The 'Set Value Dialog' box is shown with the following values:

- Dec: 8
- Hex: 0x0008
- Float: (empty)
- Bool: 0 and 1 buttons, Hex Edit... button
- Binary: 08 00, 2
- Bit Size: 1, 8, 16 (selected), 32, 64, ?

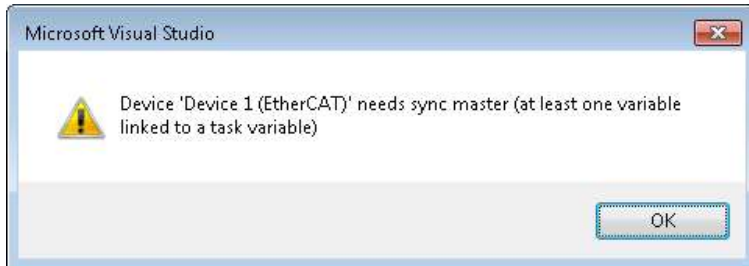
The error is cleared. A new set point can be entered again if desired:

Setpoint Flow (RD)	0.0	REAL	4.0	51.0	Input	0
Valve power (RD)	0.0	REAL	4.0	55.0	Input	0
Alarm Info (RD)	0	UINT	2.0	59.0	Input	0
HW Status (RD)	0	UINT	2.0	61.0	Input	0

## Appendix A

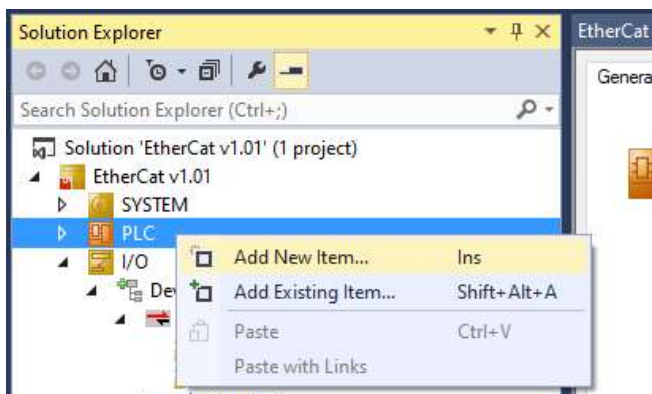
### Getting device online

When switching to run mode it is possible that the device will not come online. This is due to the warning which popped-up earlier:



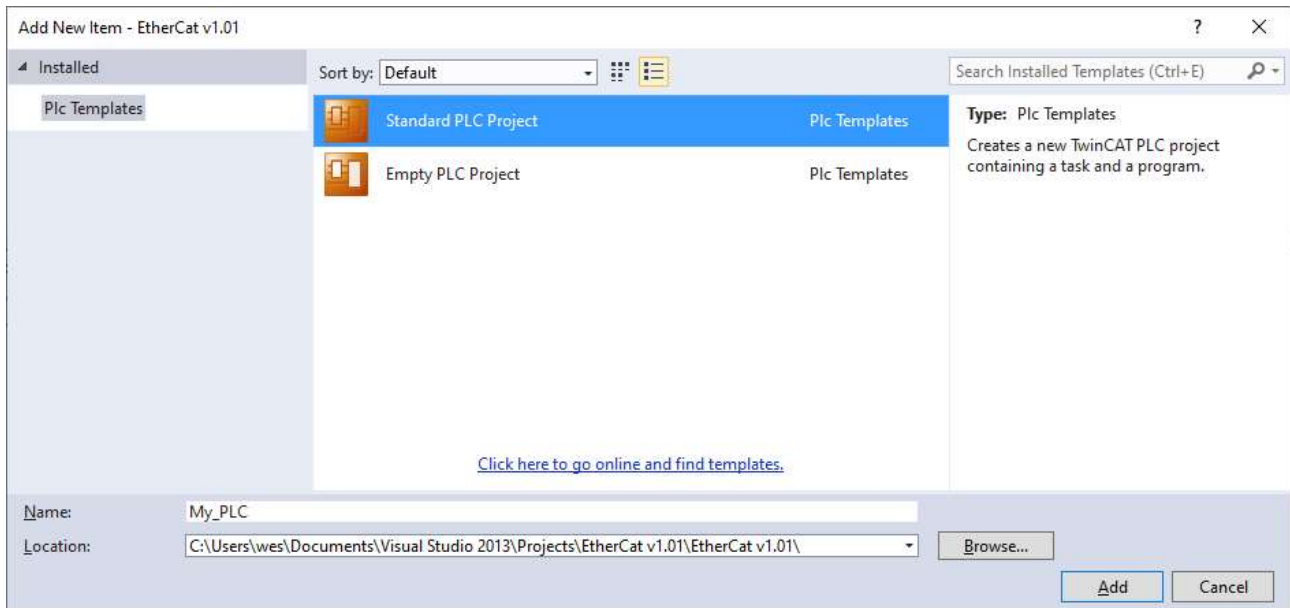
The warning indicates that the TwinCAT I/O system has not been linked to another device that can drive the I/O. This can be solved by using the integrated PLC of TwinCAT.

Go to the PLC tab and right click on it. Select "Add new item":

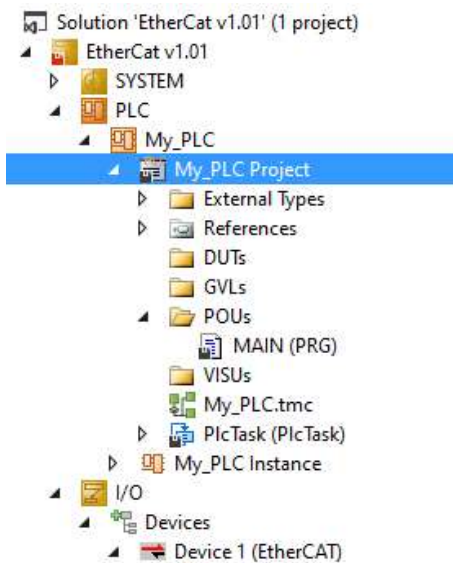


## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

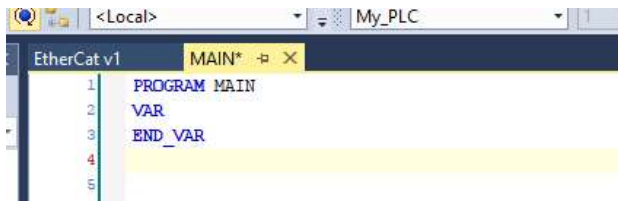
Create a new PLC project and give it a new name:



When the project has been created the following structure has been created:



Double click on "MAIN". The MAIN window will open:



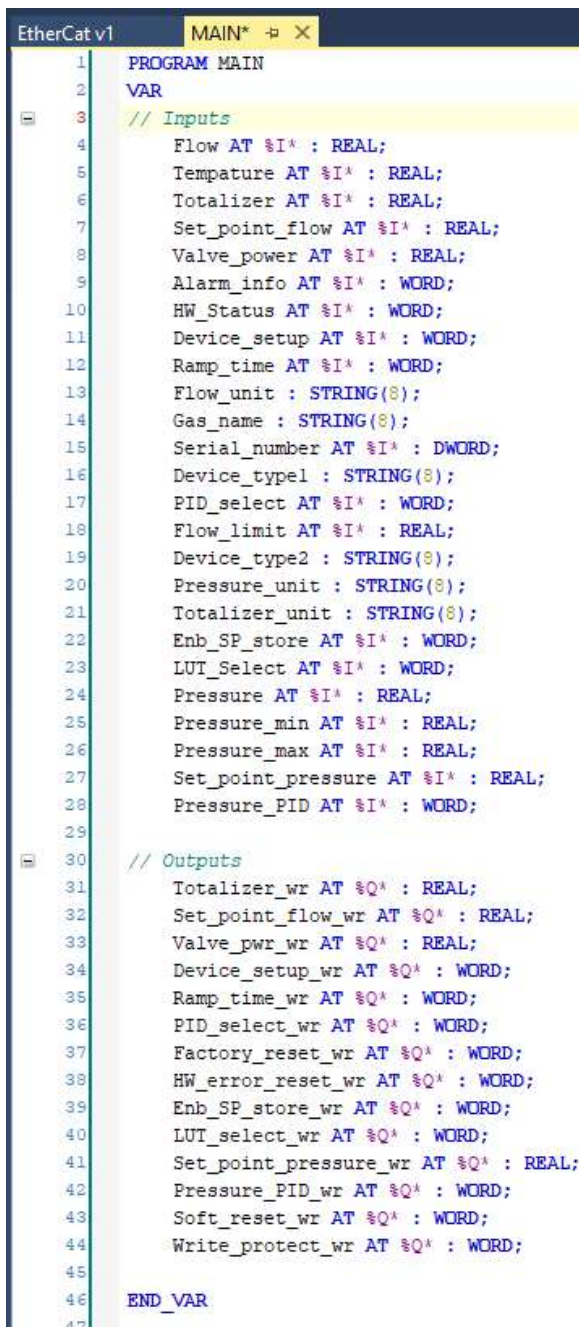
## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

Add the following code between VAR and END\_VAR (copy/paste from this document):

```
PROGRAM MAIN
VAR
// Inputs
    Flow AT %I* : REAL;
    Tempature AT %I* : REAL;
    Totalizer AT %I* : REAL;
    Set_point_flow AT %I* : REAL;
    Valve_power AT %I* : REAL;
    Alarm_info AT %I* : WORD;
    HW_Status AT %I* : WORD;
    Device_setup AT %I* : WORD;
    Ramp_time AT %I* : WORD;
    Flow_unit : STRING(8);
    Gas_name : STRING(8);
    Serial_number AT %I* : DWORD;
    Device_type1 : STRING(8);
    PID_select AT %I* : WORD;
    Flow_limit AT %I* : REAL;
    Device_type2 : STRING(8);
    Pressure_unit : STRING(8);
    Totalizer_unit : STRING(8);
    Enb_SP_store AT %I* : WORD;
    LUT_Select AT %I* : WORD;
    Pressure AT %I* : REAL;
    Pressure_min AT %I* : REAL;
    Pressure_max AT %I* : REAL;
    Set_point_pressure AT %I* : REAL;
    Pressure_PID AT %I* : WORD;

// Outputs
    Totalizer_wr AT %Q* : REAL;
    Set_point_flow_wr AT %Q* : REAL;
    Valve_pwr_wr AT %Q* : REAL;
    Device_setup_wr AT %Q* : WORD;
    Ramp_time_wr AT %Q* : WORD;
    PID_select_wr AT %Q* : WORD;
    Factory_reset_wr AT %Q* : WORD;
    HW_error_reset_wr AT %Q* : WORD;
    Enb_SP_store_wr AT %Q* : WORD;
    LUT_select_wr AT %Q* : WORD;
    Set_point_pressure_wr AT %Q* : REAL;
    Pressure_PID_wr AT %Q* : WORD;
    Soft_reset_wr AT %Q* : WORD;
    Write_protect_wr AT %Q* : WORD;

END_VAR
```

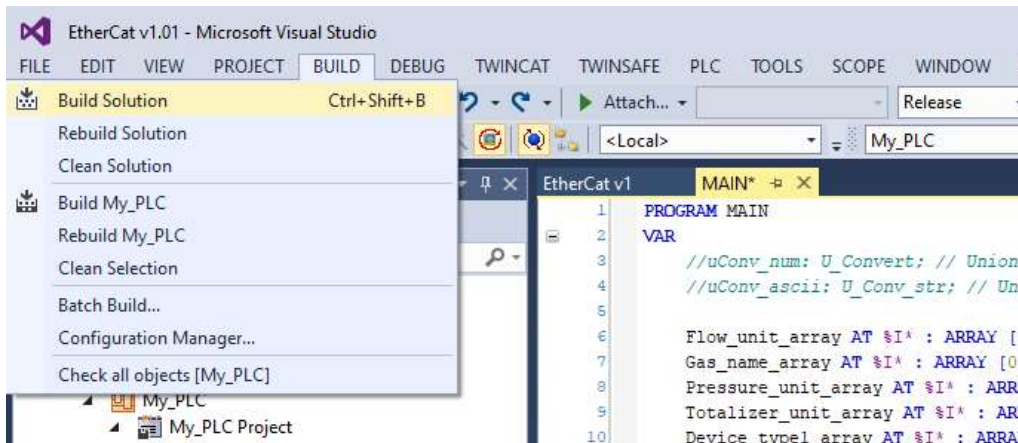


```
1 PROGRAM MAIN
2 VAR
3 // Inputs
4     Flow AT %I* : REAL;
5     Tempature AT %I* : REAL;
6     Totalizer AT %I* : REAL;
7     Set_point_flow AT %I* : REAL;
8     Valve_power AT %I* : REAL;
9     Alarm_info AT %I* : WORD;
10    HW_Status AT %I* : WORD;
11    Device_setup AT %I* : WORD;
12    Ramp_time AT %I* : WORD;
13    Flow_unit : STRING(8);
14    Gas_name : STRING(8);
15    Serial_number AT %I* : DWORD;
16    Device_type1 : STRING(8);
17    PID_select AT %I* : WORD;
18    Flow_limit AT %I* : REAL;
19    Device_type2 : STRING(8);
20    Pressure_unit : STRING(8);
21    Totalizer_unit : STRING(8);
22    Enb_SP_store AT %I* : WORD;
23    LUT_Select AT %I* : WORD;
24    Pressure AT %I* : REAL;
25    Pressure_min AT %I* : REAL;
26    Pressure_max AT %I* : REAL;
27    Set_point_pressure AT %I* : REAL;
28    Pressure_PID AT %I* : WORD;
29
30 // Outputs
31    Totalizer_wr AT %Q* : REAL;
32    Set_point_flow_wr AT %Q* : REAL;
33    Valve_pwr_wr AT %Q* : REAL;
34    Device_setup_wr AT %Q* : WORD;
35    Ramp_time_wr AT %Q* : WORD;
36    PID_select_wr AT %Q* : WORD;
37    Factory_reset_wr AT %Q* : WORD;
38    HW_error_reset_wr AT %Q* : WORD;
39    Enb_SP_store_wr AT %Q* : WORD;
40    LUT_select_wr AT %Q* : WORD;
41    Set_point_pressure_wr AT %Q* : REAL;
42    Pressure_PID_wr AT %Q* : WORD;
43    Soft_reset_wr AT %Q* : WORD;
44    Write_protect_wr AT %Q* : WORD;
45
46 END_VAR
47
```

# Tutorial:

## TwinCAT 3 & EtherCAT Voegtlin Devices

To check the code, build the solution:



Check the output window for errors and fix if any found.

## Link variable

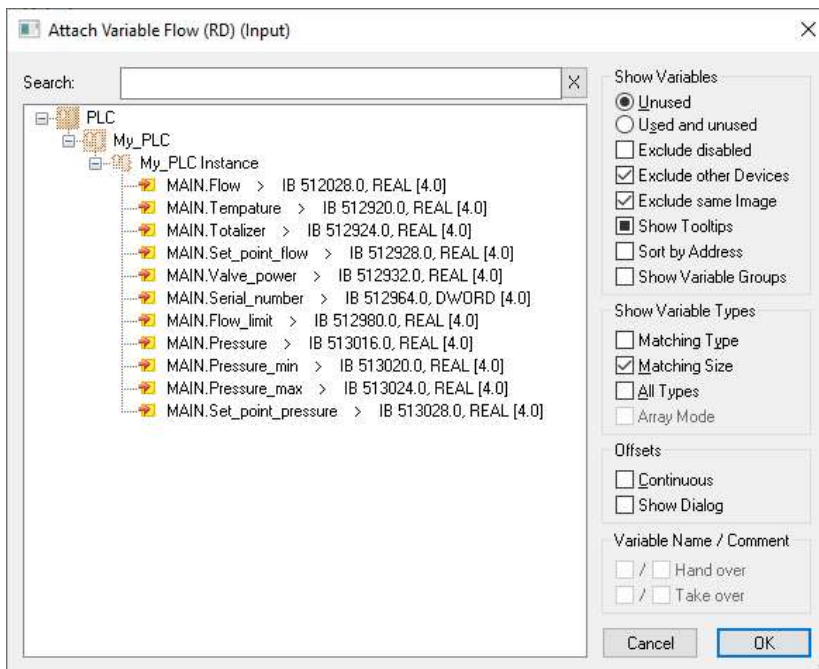
Double click on the device again to bring up the PDO list:

Name	Online	Type	Size	>Addr...	In/Out	User ID
Flow (RD)	0.0062871859	REAL	4.0	39.0	Input	0
Temperature (RD)	24.226524	REAL	4.0	43.0	Input	0
Totalizer (RD)	96.478241	REAL	4.0	47.0	Input	0
Setpoint Flow (RD)	0.0	REAL	4.0	51.0	Input	0
Valve power (RD)	0.0	REAL	4.0	55.0	Input	0
Alarm Info (RD)	0	UINT	2.0	59.0	Input	0
HW Status (RD)	0	UINT	2.0	61.0	Input	0
Device setup (RD)	5	UINT	2.0	63.0	Input	0
Ramp Time (RD)	0	UINT	2.0	65.0	Input	0
Flow unit (8 characters) (RD)		STRING(8)	9.0	67.0	Input	0
Gas name (8 characters) (RD)		STRING(8)	9.0	76.0	Input	0



## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

In the right window double click on “Flow (RD)”. A new window pops-up showing the variables from the MAIN window which are applicable:



Select “MAIN.Flow” and press “OK”. When looking at the PDO window an “X” has appeared behind flow indicating that this variable has been linked:

Name	Online	Type	Size	>Addr...	In/Out	User ID	Linked to
Flow (RD)	X 0.0071554626	REAL	4.0	39.0	Input	0	MAIN.Flow . PlcTask Inp...
Temperature (RD)	24.291618	REAL	4.0	43.0	Input	0	
Totalizer (RD)	96.507065	REAL	4.0	47.0	Input	0	
Setpoint Flow (RD)	0.0	REAL	4.0	51.0	Input	0	

Activate the configuration by pressing the “Activate Configuration” button:



TwinCAT will be restarted in Run mode and the device should be online now. There should be no warning anymore about a sync master.



# Tutorial:

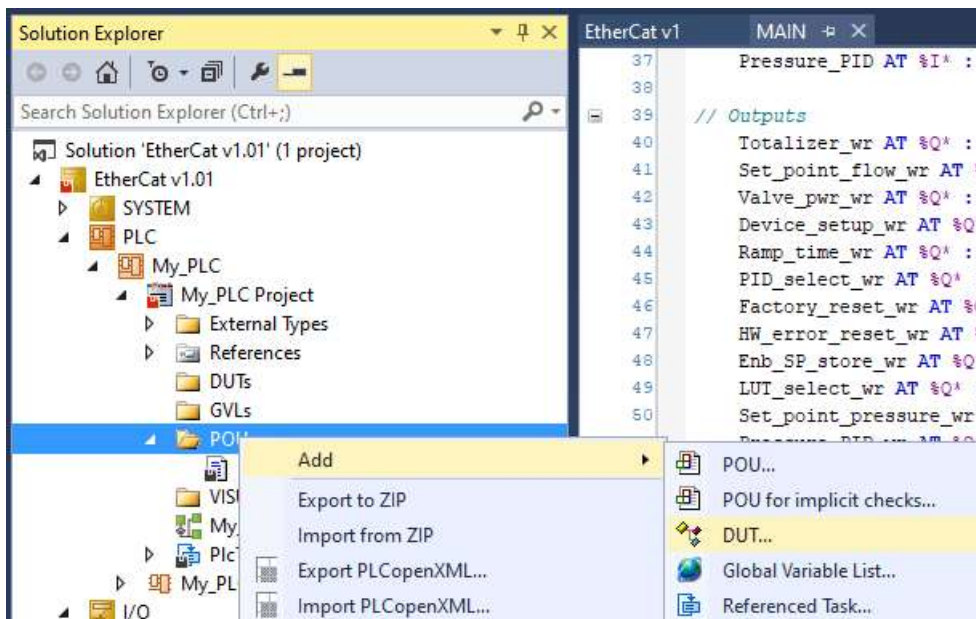
## TwinCAT 3 & EtherCAT Voegtlin Devices

### Show strings

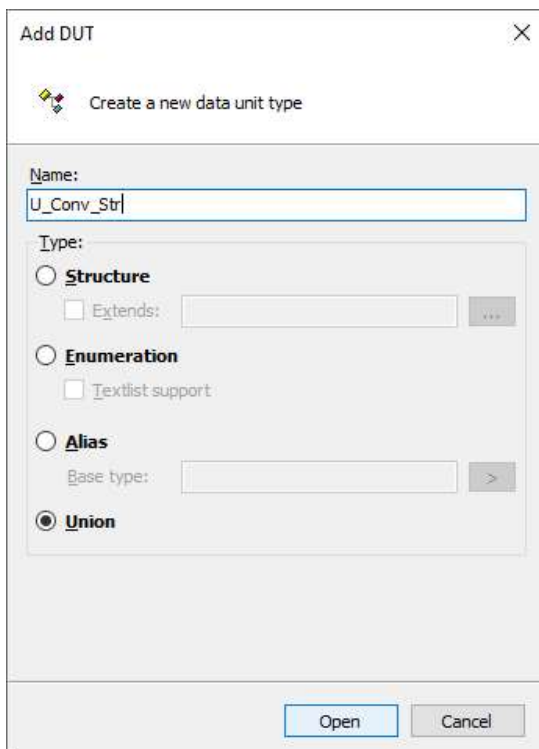
In the PDO list strings are not shown and if then only in a hexadecimal format. To show strings a script is needed which converts the data into ASCII.

The easiest way is to use a union data type for the conversion.

Right click on the POU's tab (where MAIN is) and add a new DUT:



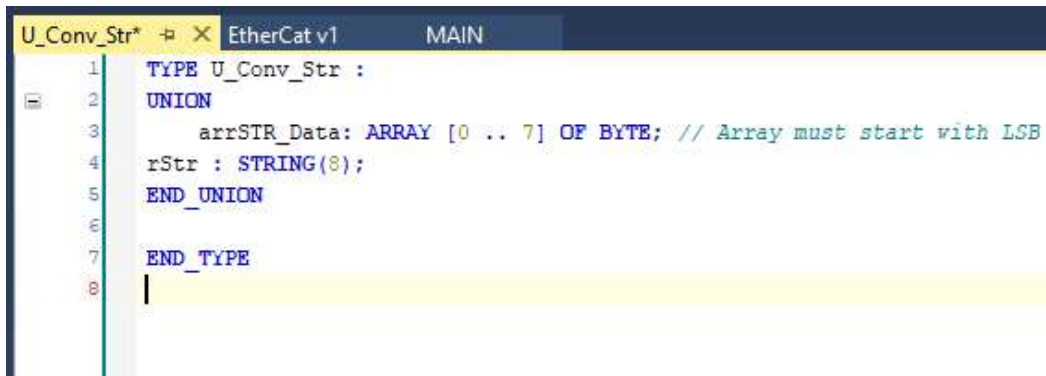
In the pop-up window select "Union" and give it a useful name, press "Open":



## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

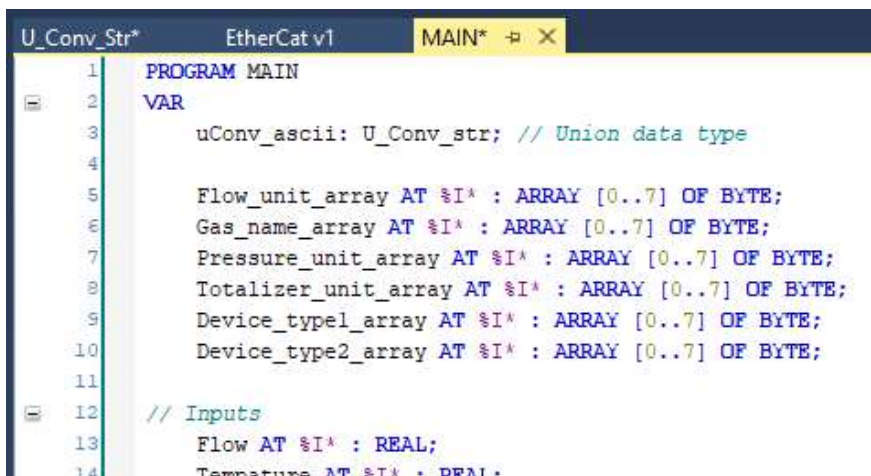
A window will open showing the script for the union. Replace the code for the code below (copy/paste):

```
TYPE U_Conv_Str :  
UNION  
    arrSTR_Data: ARRAY [0 .. 7] OF BYTE; // Array must start with LSB  
    rStr : STRING(8);  
END_UNION  
  
END_TYPE
```



In the main script add the following lines to the variable declaration (copy/paste):

```
uConv_ascii: U_Conv_str; // Union data type  
  
Flow_unit_array AT %I* : ARRAY [0..7] OF BYTE;  
Gas_name_array AT %I* : ARRAY [0..7] OF BYTE;  
Pressure_unit_array AT %I* : ARRAY [0..7] OF BYTE;  
Totalizer_unit_array AT %I* : ARRAY [0..7] OF BYTE;  
Device_type1_array AT %I* : ARRAY [0..7] OF BYTE;  
Device_type2_array AT %I* : ARRAY [0..7] OF BYTE;
```



## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

In order to use the union some more scripting needs to be done in the MAIN. Add the following code in the program array, below the declaration area (copy/paste):

```
// Flow unit
uConv_ascii.arrSTR_Data[7] := Flow_unit_array[0];
uConv_ascii.arrSTR_Data[6] := Flow_unit_array[1];
uConv_ascii.arrSTR_Data[5] := Flow_unit_array[2];
uConv_ascii.arrSTR_Data[4] := Flow_unit_array[3];
uConv_ascii.arrSTR_Data[3] := Flow_unit_array[4];
uConv_ascii.arrSTR_Data[2] := Flow_unit_array[5];
uConv_ascii.arrSTR_Data[1] := Flow_unit_array[6];
uConv_ascii.arrSTR_Data[0] := Flow_unit_array[7];

Flow_unit := uConv_ascii.rStr;

// Gas name
uConv_ascii.arrSTR_Data[7] := Gas_name_array[0];
uConv_ascii.arrSTR_Data[6] := Gas_name_array[1];
uConv_ascii.arrSTR_Data[5] := Gas_name_array[2];
uConv_ascii.arrSTR_Data[4] := Gas_name_array[3];
uConv_ascii.arrSTR_Data[3] := Gas_name_array[4];
uConv_ascii.arrSTR_Data[2] := Gas_name_array[5];
uConv_ascii.arrSTR_Data[1] := Gas_name_array[6];
uConv_ascii.arrSTR_Data[0] := Gas_name_array[7];

Gas_name := uConv_ascii.rStr;

// Pressure unit
uConv_ascii.arrSTR_Data[7] := Pressure_unit_array[0];
uConv_ascii.arrSTR_Data[6] := Pressure_unit_array[1];
uConv_ascii.arrSTR_Data[5] := Pressure_unit_array[2];
uConv_ascii.arrSTR_Data[4] := Pressure_unit_array[3];
uConv_ascii.arrSTR_Data[3] := Pressure_unit_array[4];
uConv_ascii.arrSTR_Data[2] := Pressure_unit_array[5];
uConv_ascii.arrSTR_Data[1] := Pressure_unit_array[6];
uConv_ascii.arrSTR_Data[0] := Pressure_unit_array[7];

Pressure_unit := uConv_ascii.rStr;

// Totalizer unit
uConv_ascii.arrSTR_Data[7] := Totalizer_unit_array[0];
uConv_ascii.arrSTR_Data[6] := Totalizer_unit_array[1];
uConv_ascii.arrSTR_Data[5] := Totalizer_unit_array[2];
uConv_ascii.arrSTR_Data[4] := Totalizer_unit_array[3];
uConv_ascii.arrSTR_Data[3] := Totalizer_unit_array[4];
uConv_ascii.arrSTR_Data[2] := Totalizer_unit_array[5];
uConv_ascii.arrSTR_Data[1] := Totalizer_unit_array[6];
uConv_ascii.arrSTR_Data[0] := Totalizer_unit_array[7];

Totalizer_unit := uConv_ascii.rStr;
```

## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

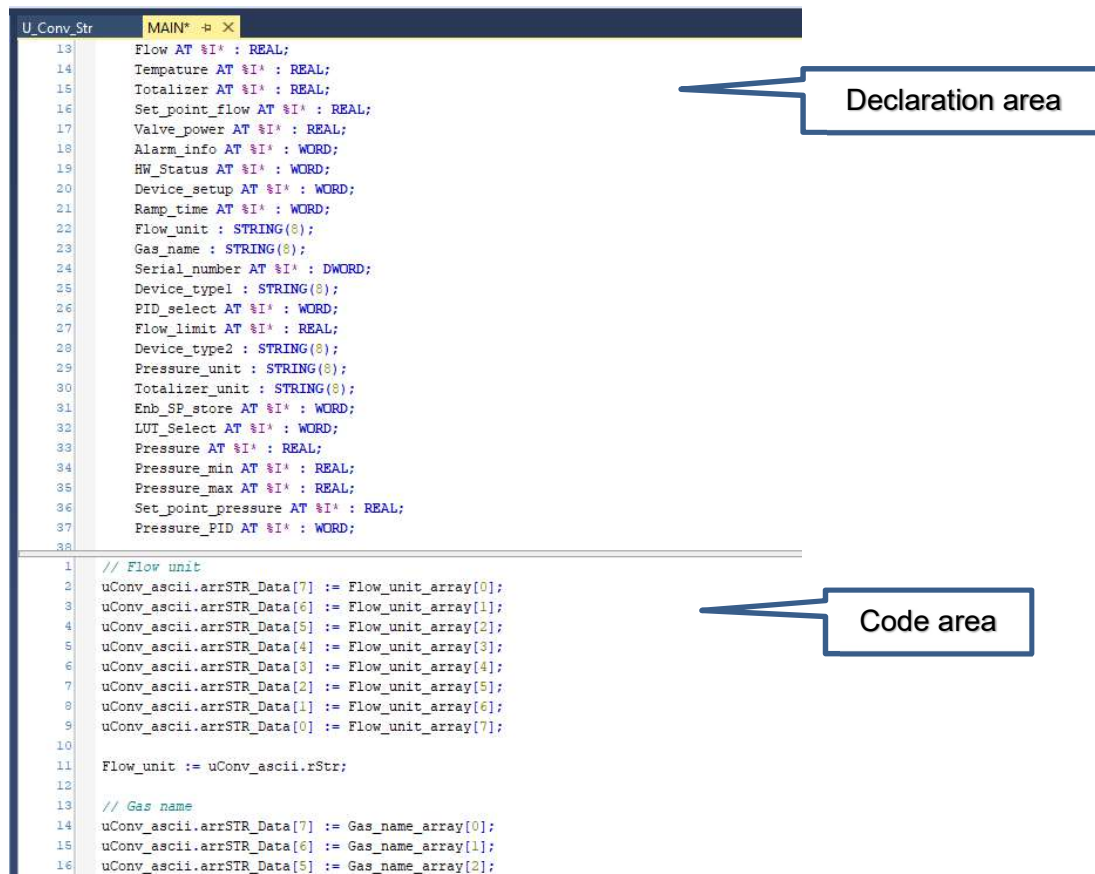
```
// Device_type1
uConv_ascii.arrSTR_Data[7] := Device_type1_array[0];
uConv_ascii.arrSTR_Data[6] := Device_type1_array[1];
uConv_ascii.arrSTR_Data[5] := Device_type1_array[2];
uConv_ascii.arrSTR_Data[4] := Device_type1_array[3];
uConv_ascii.arrSTR_Data[3] := Device_type1_array[4];
uConv_ascii.arrSTR_Data[2] := Device_type1_array[5];
uConv_ascii.arrSTR_Data[1] := Device_type1_array[6];
uConv_ascii.arrSTR_Data[0] := Device_type1_array[7];
```

```
Device_type1 := uConv_ascii.rStr;
```

```
// Device_type2
uConv_ascii.arrSTR_Data[7] := Device_type2_array[0];
uConv_ascii.arrSTR_Data[6] := Device_type2_array[1];
uConv_ascii.arrSTR_Data[5] := Device_type2_array[2];
uConv_ascii.arrSTR_Data[4] := Device_type2_array[3];
uConv_ascii.arrSTR_Data[3] := Device_type2_array[4];
uConv_ascii.arrSTR_Data[2] := Device_type2_array[5];
uConv_ascii.arrSTR_Data[1] := Device_type2_array[6];
uConv_ascii.arrSTR_Data[0] := Device_type2_array[7];
```

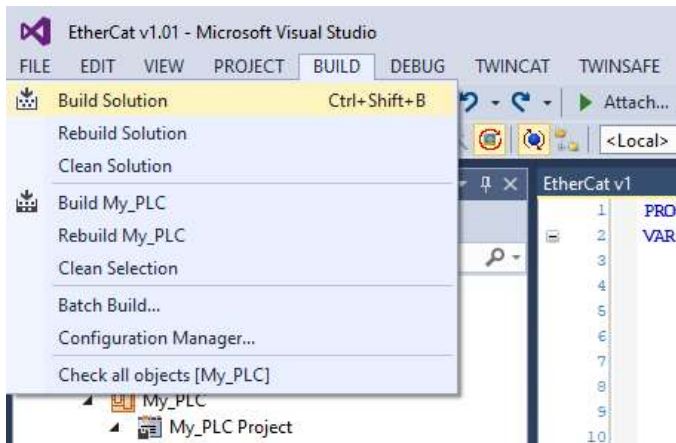
```
Device_type2 := uConv_ascii.rStr;
```

It will look like this:



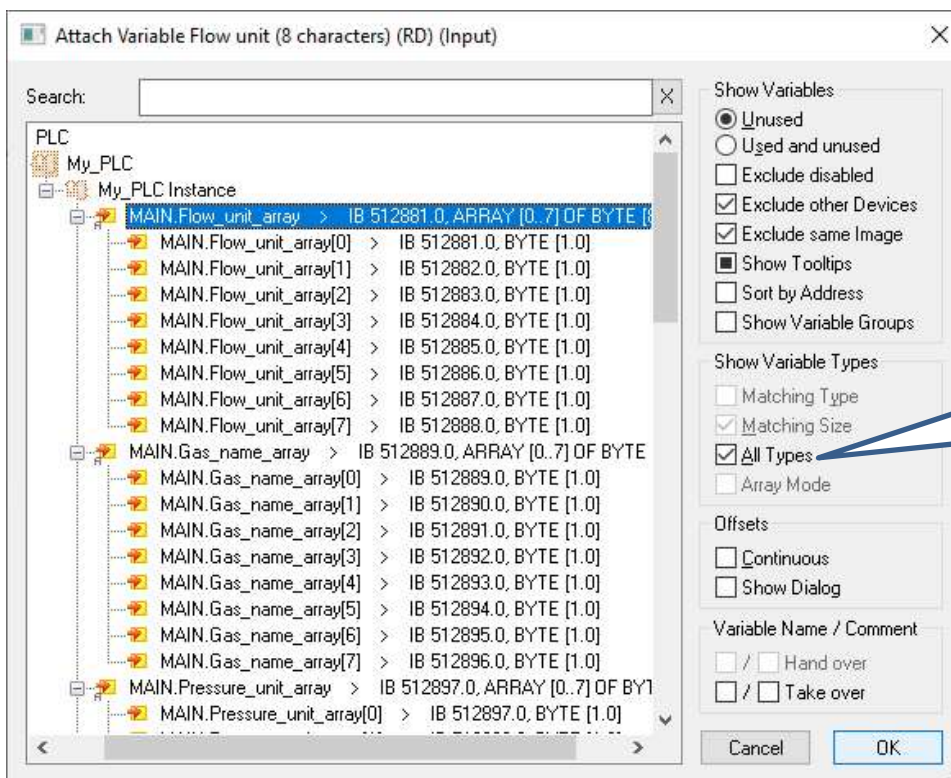
## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

To check the code, build the solution:



Check the output window for errors and fix if any found.

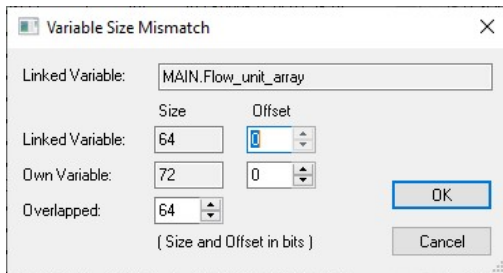
Link the strings to the MAIN variables. Go to the PDO view and double click on a string variable (fi Flow Unit). Select from the pop-up window the corresponding string variable:





## Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices




















A window might pop-up warning about a type mismatch. Leave the settings as they are and press “Ok”:



Do the same for all the other strings. Activate the created configuration by pressing the “Activate Configuration” button:

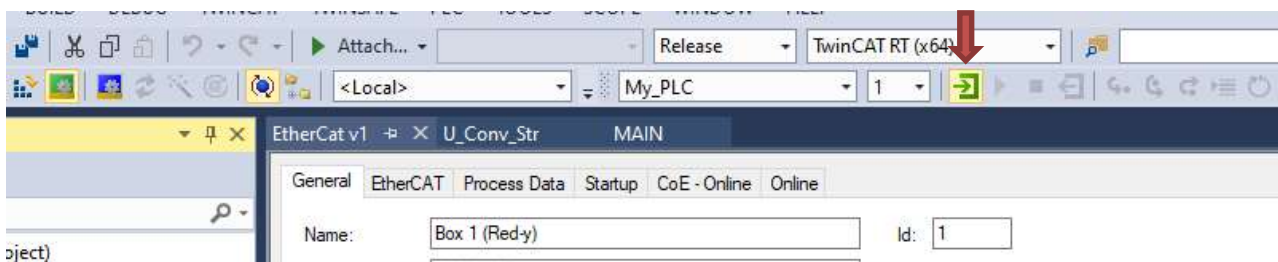


The PDO window will look like this:

Name	Online	Type	Size	>Addr...	In/Out	User ID	Linked to	
 Flow (RD)	X	0.0072591184	REAL	4.0	39.0	Input	0	MAIN.Flow . PlcTask Inputs . My_PLC Instance . My_PLC
 Temperature (RD)		24.254425	REAL	4.0	43.0	Input	0	
 Totalizer (RD)		104.83397	REAL	4.0	47.0	Input	0	
 Setpoint Flow (RD)		0.0	REAL	4.0	51.0	Input	0	
 Valve power (RD)		0.0	REAL	4.0	55.0	Input	0	
 Alarm Info (RD)		0	UINT	2.0	59.0	Input	0	
 HW Status (RD)		0	UINT	2.0	61.0	Input	0	
 Device setup (RD)		5	UINT	2.0	63.0	Input	0	
 Ramp Time (RD)		0	UINT	2.0	65.0	Input	0	
 Flow unit (8 characters) (RD)	X		STRING(8)	9.0	67.0	Input	0	MAIN.Flow_unit_array . PlcTask Inputs . My_PLC Instance . My_PLC
 Gas name (8 characters) (RD)	X		STRING(8)	9.0	76.0	Input	0	MAIN.Gas_name_array . PlcTask Inputs . My_PLC Instance . My_PLC
 Serial (RD)		163194	UDINT	4.0	85.0	Input	0	
 Device Type1 (8 characters) (RD)	X		STRING(8)	9.0	89.0	Input	0	MAIN.Device_type1_array . PlcTask Inputs . My_PLC Instance . My_PLC
 PID select (RD)		0	UINT	2.0	98.0	Input	0	
 Max flow (RD)		60.0	REAL	4.0	100.0	Input	0	
 Device Type2 (8 characters) (RD)	X		STRING(8)	9.0	104.0	Input	0	MAIN.Device_type2_array . PlcTask Inputs . My_PLC Instance . My_PLC
 Pressure unit (8 characters) (RD)	X		STRING(8)	9.0	113.0	Input	0	MAIN.Pressure_unit_array . PlcTask Inputs . My_PLC Instance . My_PLC
 Totalizer unit (8 characters) (RD)	X		STRING(8)	9.0	122.0	Input	0	MAIN.Totalizer_unit_array . PlcTask Inputs . My_PLC Instance . My_PLC
 Enable setpoint storage (RD)		0	UINT	2.0	131.0	Input	0	

Note that the strings are still not shown. The script isn't running yet. To run the script the PLC needs to be loaded and started.

Start the PLC (login):

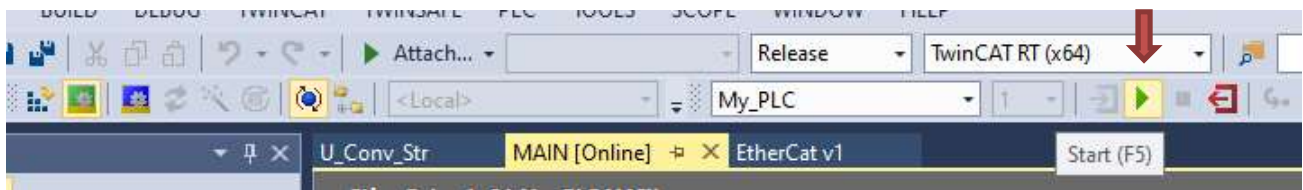


# Tutorial: TwinCAT 3 & EtherCAT Voegtlin Devices

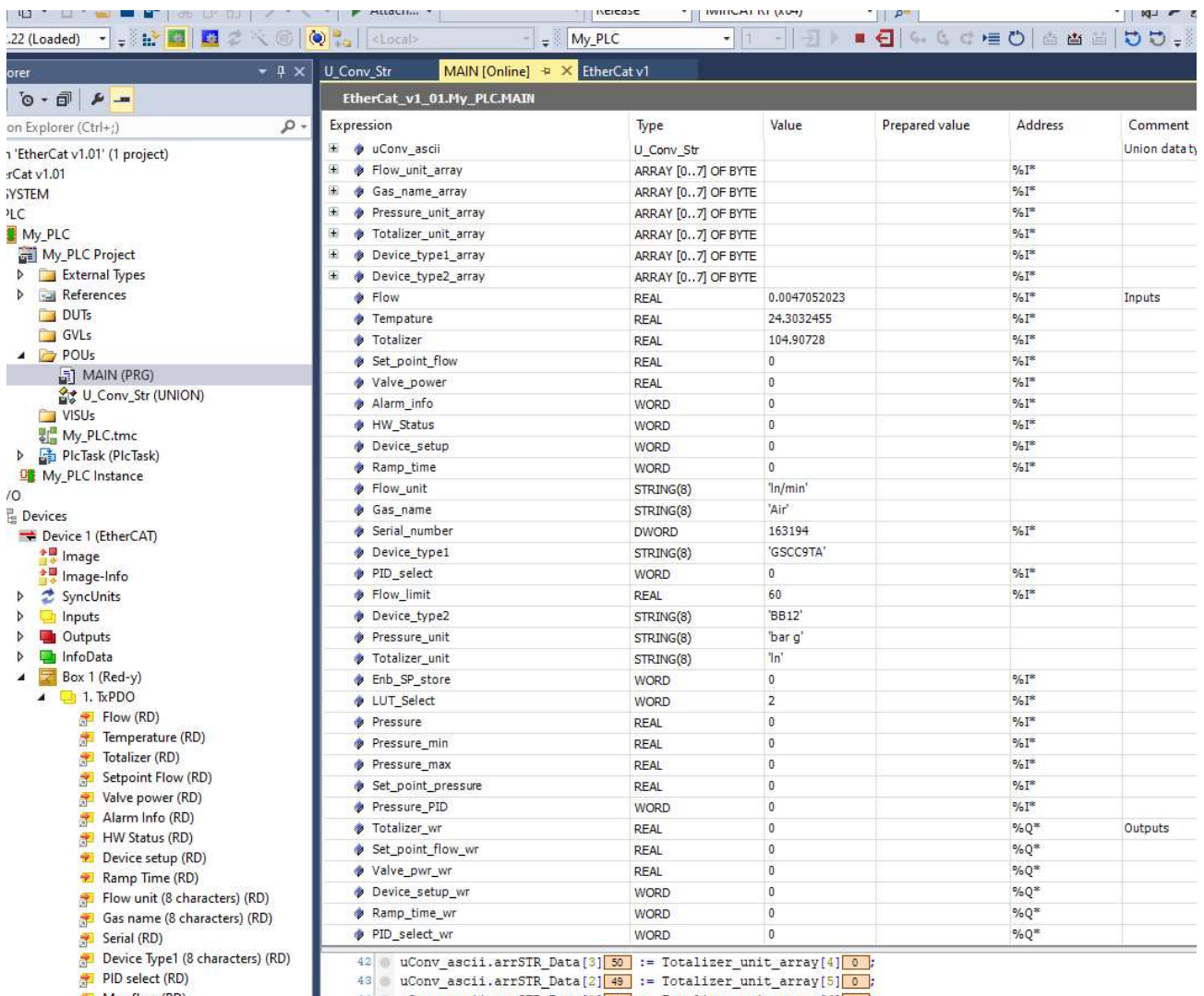
Press “Yes” in the following pop-up:



The MAIN window is shown but no data is presented yet. Start the PLC:



In the MAIN window the data will be shown:



*Note: in the image above more variables have been linked.*