

Manual | EN

TS6370

TwinCAT 2 | DriveCOM OPC Server



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1 Foreword

1.1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement. No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:

EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702

with corresponding applications or registrations in various other countries.



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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Description of symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

DANGER

Serious risk of injury!

Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.

WARNING

Risk of injury!

Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.

CAUTION

Personal injuries!

Failure to follow the safety instructions associated with this symbol can lead to injuries to persons.

NOTICE

Damage to the environment or devices

Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.



Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

In addition, the recommendations from Beckhoff regarding appropriate protective measures should be observed. Further information regarding information security and industrial security can be found in our <https://www.beckhoff.com/secguide>.

Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at <https://www.beckhoff.com/secinfo>.

2 Installation Sequence

Minimum Requirements:

- Beckhoff TwinCAT 2.9 Build 1025
- Beckhoff TwinCAT DriveCOM OPC Server 4.0.0.60
- Beckhoff FC310x Profibus Master with Firmware 2.56
or
Beckhoff CX1500-M310 Profibus Master with Firmware 2.57
- Siemens SimoComU 08.01.03 to access Siemens SimuDrives 611U drives
or
Siemens DriveMonitor V5.3 SP3 to access Siemens MasterVC Plus drives
- Siemens 611u with firmware version 07.01.03

Installation Sequence

1. Install TwinCAT
2. Install TwinCAT DriveCom OPC Server
3. Install SimoComU software
4. Add and configure the Profibus Master in the System Manager
(See [TwinCAT Profibus Master Configuration \[▶ 24\]](#))
5. Add and configure the ProfiDrives in the System Manager
(See [TwinCAT ProfiDrive Configuration \[▶ 27\]](#))
6. Add and configure the NC-Axes in the System Manager
(See [TwinCAT NC Configuration \[▶ 14\]](#))
7. Activate configuration
8. Configure the TwinCAT DriveCOM OPC server
(See [TwinCAT DriveCOM OPC Configuration \[▶ 36\]](#))
9. Configure the SimoComU software to work with TwinCAT DriveCOM OPC
(See [SimoComU OPC Configuration \[▶ 59\]](#))
10. Configure the ProfiDrive in SimoComU via OPC
(See [SimoComU ProfiDrive Configuration \[▶ 53\]](#))

3 Technical Introduction (Marketing)

TwinCAT DriveCOM : The wish

BECKHOFF New Automation Technology

OPC acting as a data channel : Motion Control

Engineering

Fieldbus

Drive

?

Wish :

- standard access
- easy (plug and play)
- fieldbus independent
- access to all parameters and functions
- remote access

Drives may not support serial interfaces !
→ requires configuration via fieldbus

Setup

Diagnostic

2 St. Hoppe
16.07.2004

TwinCAT DriveCOM : The specs

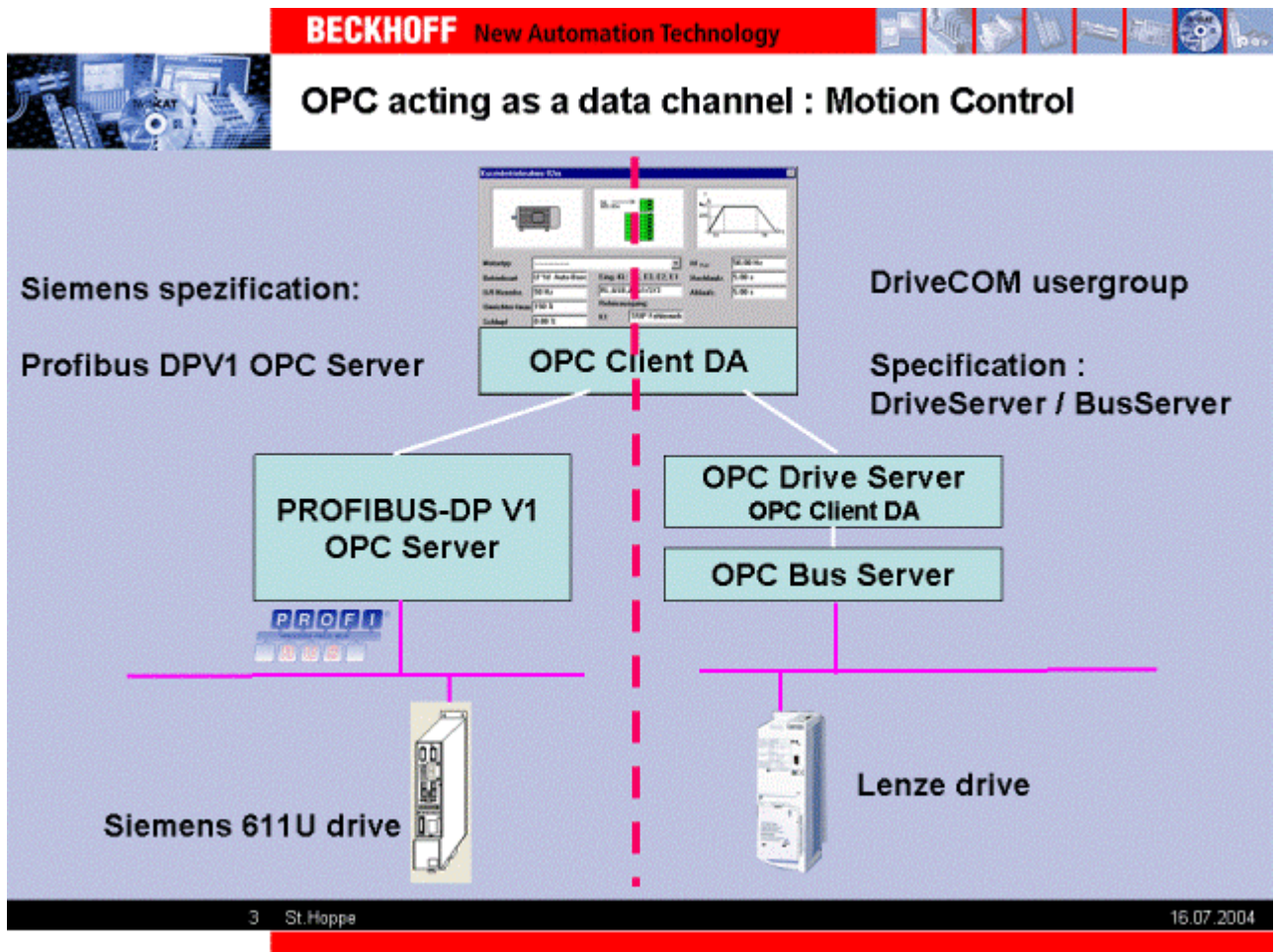


Fig. 1: SimuComU_Intro3

TwinCAT DriveCOM : The Profibus DPV1 OPC server spec

BECKHOFF New Automation Technology

OPC acting as a data channel : Motion Control



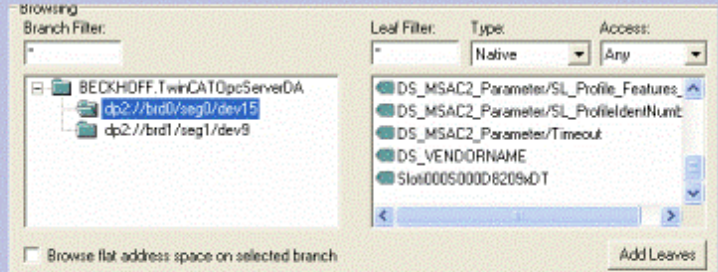
OPC Client

PROFIBUS-DP V1
OPC Server

Sample namespace :

DPV1 OPC Server offers a
specific profile in his namespace

Siemens Spec:
Profibus DPV1
OPC Server

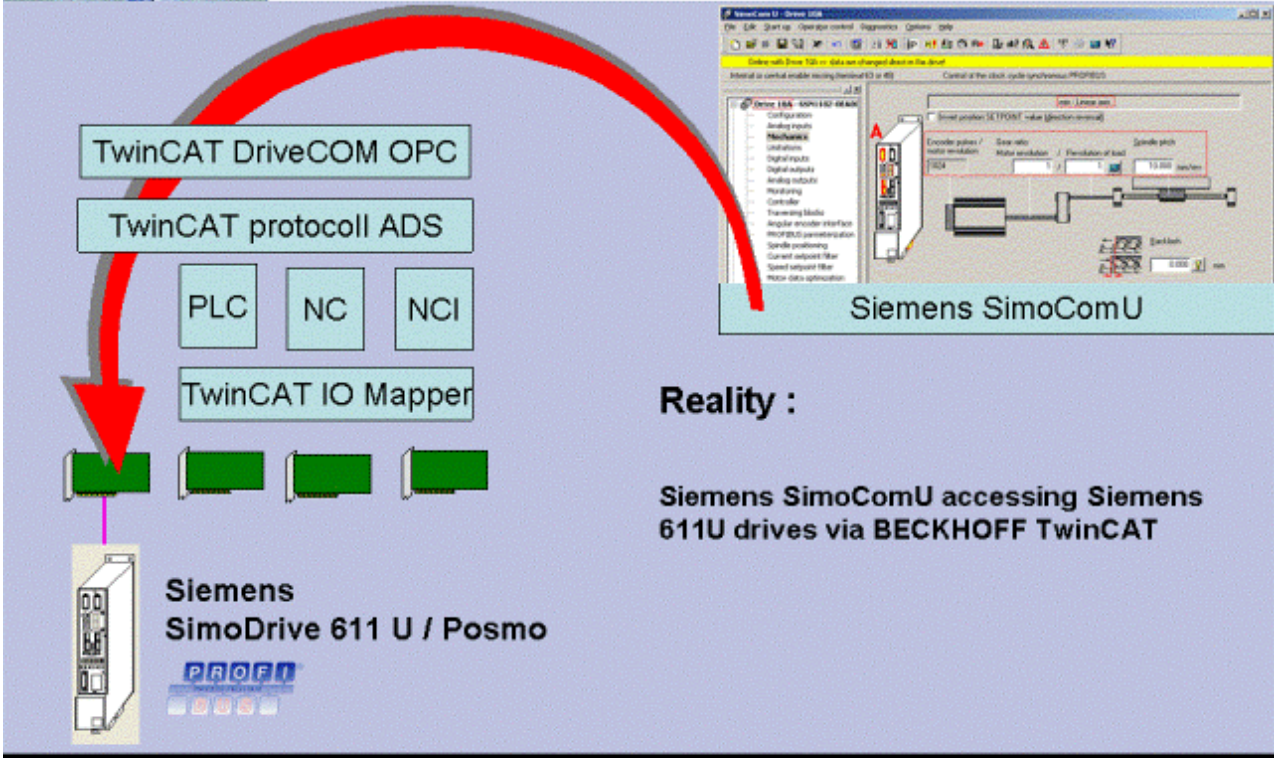


TwinCAT DriveCOM : The existing solution 1/2

BECKHOFF New Automation Technology



OPC acting as a data channel : Motion Control



TwinCAT DriveCOM : The existing solution 2/2

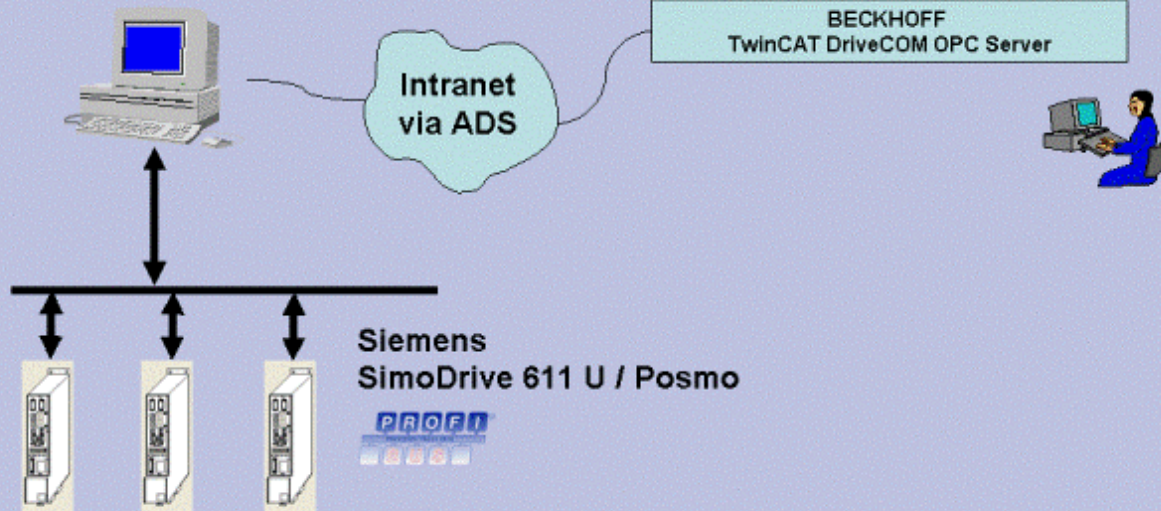
BECKHOFF New Automation Technology



OPC acting as a data channel : Motion Control

Benefit :

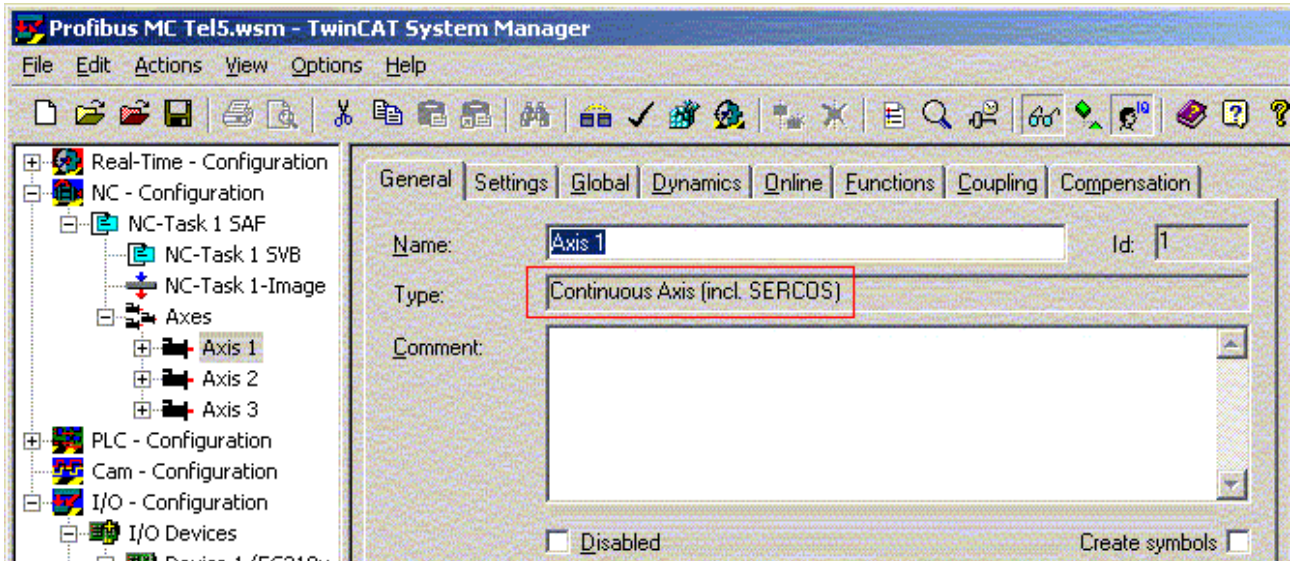
Central, network wide access for setup and diagnostic



4 TwinCAT NC Configuration

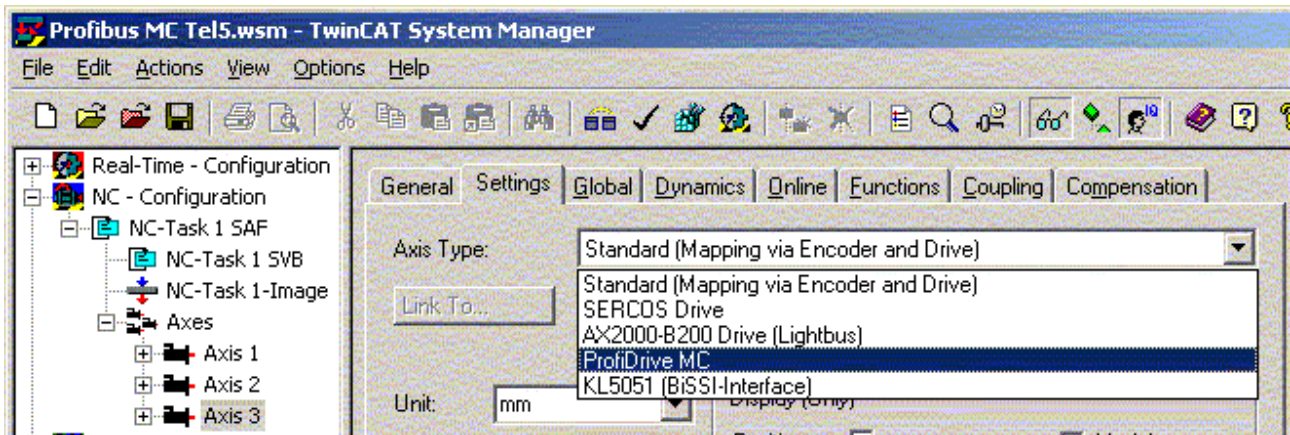
1. Add NC axis

Add to the NC axes a "Continuous Axis" for each ProfiDrive, e.g. the NC-Task 1 has to be added if it is not yet there.



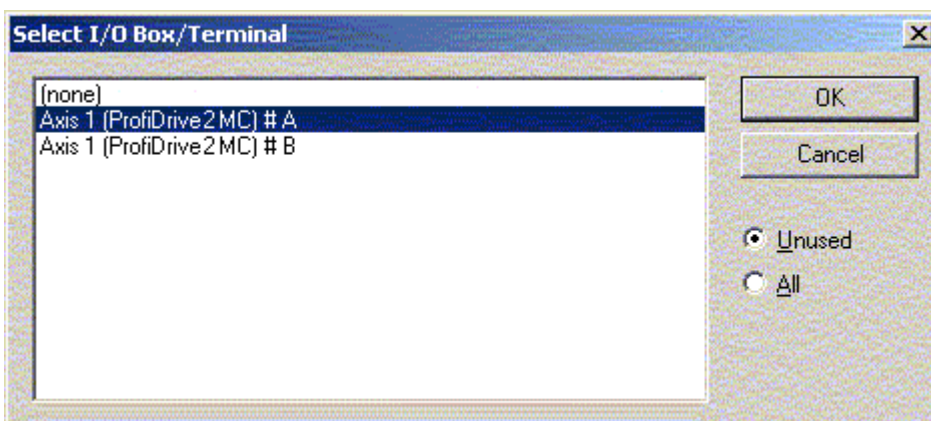
2. Select Axis Type

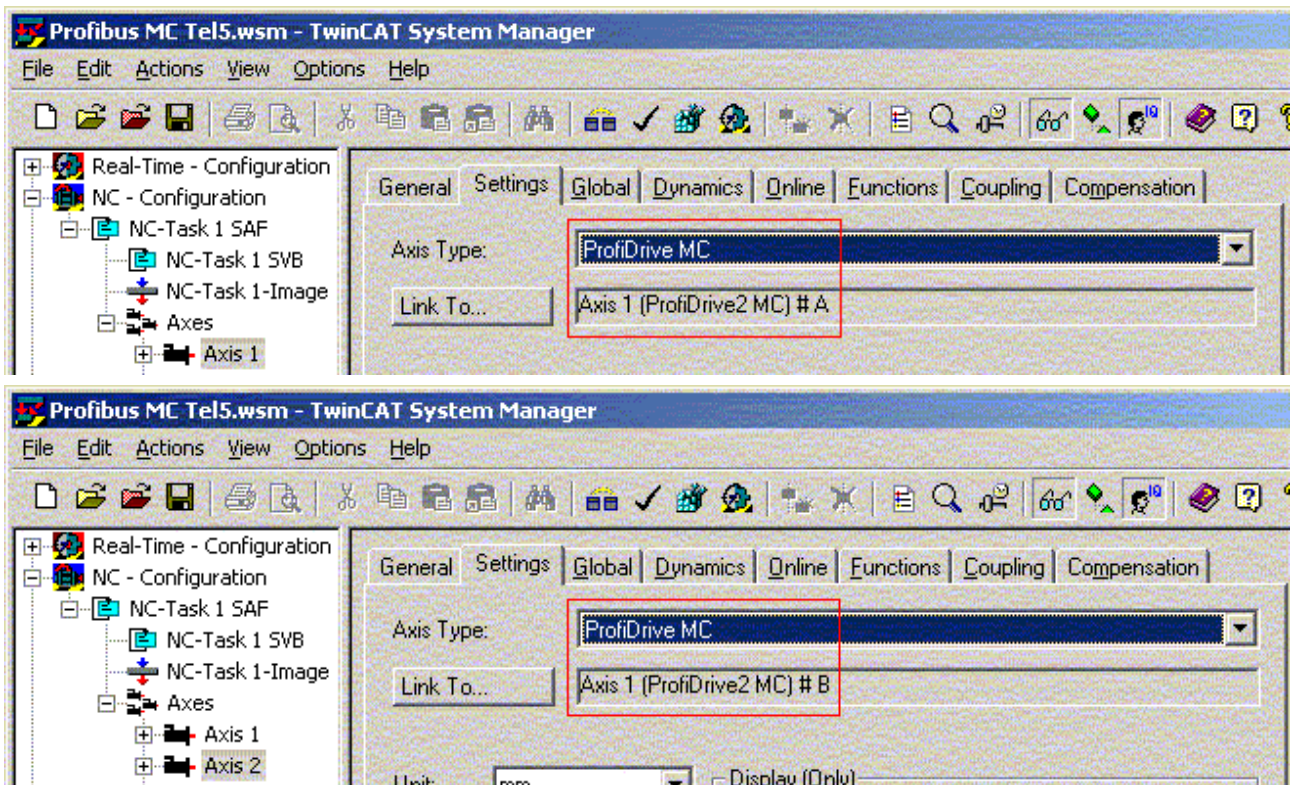
Select the Axis Type "ProfiDrive MC".



3. Link NC Axis to ProfiDrive

Link each NC Axis to a ProfiDrive (Double drives have one axis number but two channels, first "A" and second "B").





4. Necessary Encoder Settings

4.1 Encoder Scaling

Setup the NC Scaling Factor to a value that represents the amount of mm that the load moves with one encoder increment (Position feedback over the Profibus). The gearbox and the spindle pitch can be setup in the drive (see Mechanics of [SimoComU ProfiDrive Configuration](#) | 53|) or be part of the NC encoder scaling factor, but only in one place.

The NC-Axis Encoder-Scaling-factor can be calculated with the following formula:

$$\text{Scaling factor} = 1 / (\text{Increments Per Revolution} / \text{feedconstant})$$

Example:

$$\begin{aligned} \text{feedconstant} &= 10 \text{ mm/rev} \\ \text{Increments per Revolution} &= 2097152 \text{ INC/rev} \end{aligned}$$

$$\text{Scaling factor} = 1 / (2097152[\text{INC/rev}] / 10[\text{mm/rev}]) = 0.00000476837158203 \text{ [mm/INC]}$$

See chapter "5. NC ProfiDrive Settings" for calculation of increments per revolution.

4.2 Encoder Bit Rejection Filter Mask

The position feedback is smoothed by rejecting (ignoring) the lowest 11bits of the position feedback. The smoothing algorithm uses the "Encoder bit rejection filter mask" with the default value 0x7FFh for that. This is only useful for Encoders with a high number of lines (i.e., 1024, 2048) plus 11 bits of fine resolution.

When using encoders with a low number of lines (i.e., 32) or a smaller fine resolution, this filter mask value must be set to a lower value (i.e., 0). If too many bits are rejected, the NC sees steps in the position feedback. This causes a bigger following error (lag distance) and the axis might vibrate violently, especially in combination with telegram type 5 or 105 (Dynamic Stiffness Control).

4.3 Encoder Reference System

The 611u can report two position feedbacks per encoder, the incremental position value is always reported in Gx_XIST1, the absolute position value is on demand reported in Gx_XIST2. When using an absolute encoder, then the reference system must be set to ABS or ABS_MODULO, otherwise to INC. In case of ABS or ABS_MODULO the NC is requesting the absolute position value from the drive.

With INC the drive resets the position to 0 after powerup regardless of the physically position of the axis. This is a pure incremental behavior. All overflows of the 32bit position feedback (hard increments) are counted and added to the 64bit encoder soft increments.

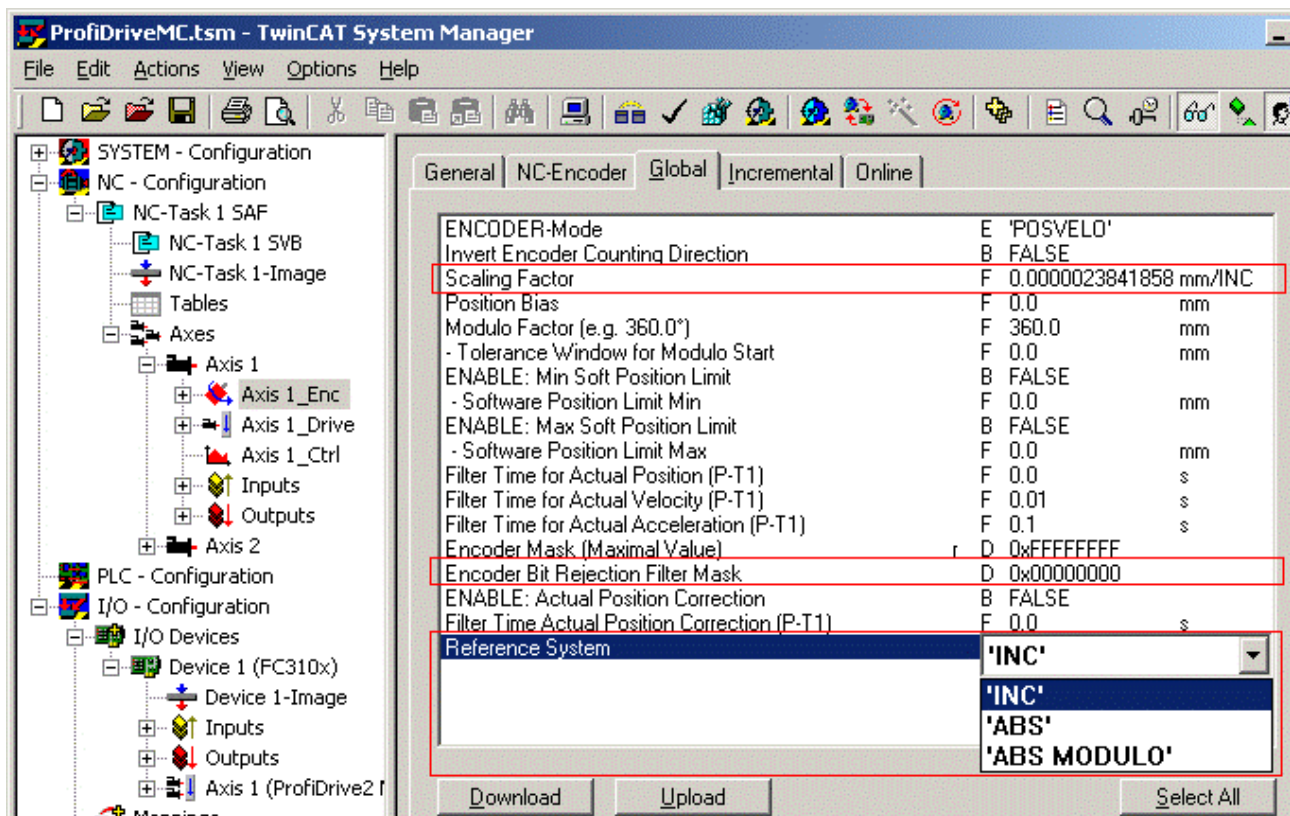
With ABS the real absolute position (hard increments) is used in the NC and directly extended to 64bits encoder soft increments. The overflow of the hard increments causes a maximum following error of 32bits and is not permitted.

With ABS_MODULO the NC keeps track of the overflows of the 32bit position value (hard increments) and extends it properly to 64bits. Multiple overflows are possible. This mode is similar to the SERCOS position feedback.

NOTICE

If the NC (TwinCAT System) is stopped it always starts up as if there was no overflow. If the hard increment is between 0x80000000 and 0xFFFFFFFF then the NC takes it as a negative position and sets the overflow counter to -1.

E.g., the "Expert Mode (IQ)" of the System Manager must be activated to see the Encoder Bit Rejection Filter Mask parameter.



5. NC ProfiDrive Settings

5.1 Using an Encoder

The encoder setup for ProfiDrives is done on the NC axis ProfiDrive tab. When using an encoder, then the radio button "Encoder (P1005)" must be selected. By this selection the multiplier for the encoder lines is automatically preset with 0x0800 (dec. 2048). This factor (fine resolution, P1043) might be different for other drives than the 611u.

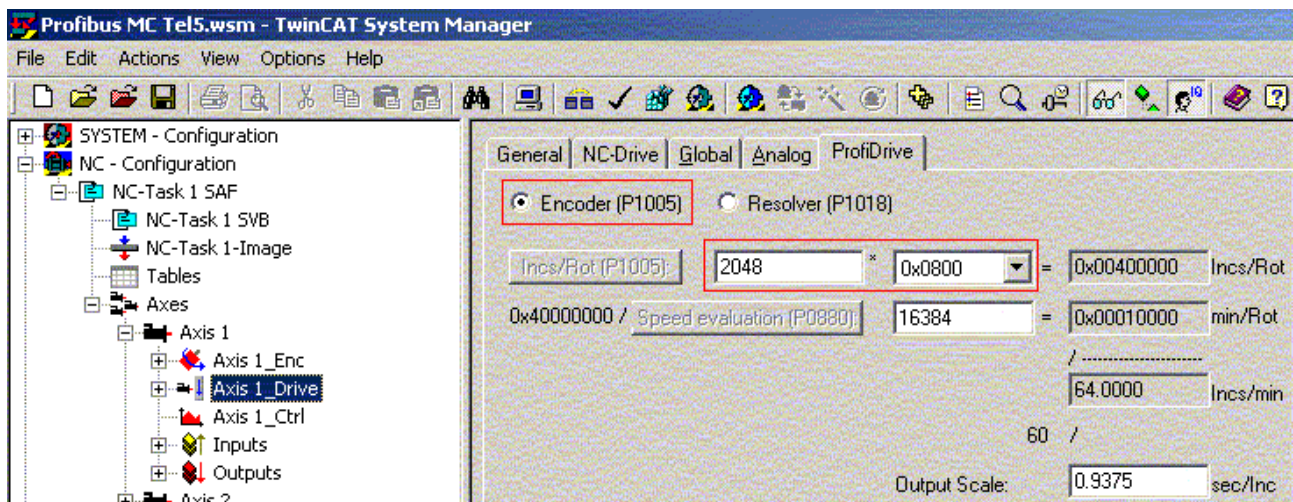
Additionally, the amount of encoder lines must be set up for the calculation of the ProfiDrive Encoder Scaling. The amount of encoder lines is in the drive parameter P1005. The value of parameter P1005 can be looked up on the Drive Online tab and must be entered into the edit box beside "Incs/Rot (P1005):".

The ProfiDrive Velocity Scaling is in the drive parameter P880 and tells the NC about how to scale the velocity setpoint. The value of parameter P880 can be looked up on the Drive Online tab and has to be entered into the edit box beside "Speed evaluation (P0880)".

The System Manager currently calculates the output scaling according to the following formula:

```
Output Scale := 60 /
((P1005 * 0x0800) /
(0x40000000 / P880 ))
[sec/Inc] := [sec/min]
/ (([Inc/rot]) / ( 1 / [rot/min]))
```

To prove the output scale that the System Manager has calculated, the steps in the chapters 5.1.1 to 5.1.3 should be executed. If this leads to a different result, then the output scale on the ProfiDrive tab must be overwritten with the manually calculated value. But any change of the parameters in the formula on the ProfiDrive tab forces automatically a new calculation of the output scale with the formula above. A manually entered output scale will be overwritten.



5.1.1 Calculate increments per revolution

The parameter P979 Encoder Format contains the information needed, to calculate the increments per revolution. To choose the proper sub index, it has to be distinguished between "IM" indirect measurement (on the motor, uses G1) and "DM" direct measurement (on the load, uses G2) and if the NC Reference System is set to "INC" incremental (uses XIST1) or "ABS"/"ABS MODULO" absolute (uses XIST2).

For simplification the following assumption are made:

- Gearbox ratio in the 611u is set 1:1 (P237, P238)
- XIST3 is not used

Depending on these two selections the formular to calculate the increments per revolution looks like one of the following:

```
Encoder on the motor:

    Incremental Position (G1_XIST1)

    Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Signal P979:4

    Absolut Position (G1_XIST2)

    Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Abs P979:5

Encoder on the load:
```

```

Incremental Position (G2_XIST1)

Increments per revolution = Encoder Resolution P979:13 * 2^
Shift Factor Signal P979:14

Absolut Position (G2_XIST2)

Increments per revolution = Encoder Resolution P979:13 * 2^
Shift Factor Abs P979:15

Encoder with 2048 lines on the motor, incremental value, 11bit fine
resolution (P979:4 = 11):

Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Signal P979:4

Increments per revolution = 0x00000800 * 2^11 = 2^11 *
2^11 = 2^22 = 4194304 = 0x00400000

```

5.1.2 Calculate output scaling

The output scaling on the ProfiDrive tab can be calculated in the following way:

```

Output
Scale = 60[s/min] / (IncPerRev / (0x40000000 / Speed Evaluation P880
[rev/min]))

```

Example

```

Speed Evaluation P880 = 16384 = 0x00004000

Increments per revolution = 4194304 = 0x00400000 INC/rev

Output
Scale= 60[s/min] / (0x00400000[INC/rev] /
(0x40000000 / 0x00004000[rev/min]))
Output Scale=
60[s/min] / 64[INC/min] = 0.9375 [s/INC]

```

5.1.3 Check output scaling

The test can only be done if the axis can move a short distance with constant velocity.

⚠ WARNING

Attention, if the scaling is wrong or the tuning is too aggressive, the axis might take off fast and slam hard into the bumper!

To check the output scale the NC axis has carefully to be moved by the NC with a slow speed, with no proportional gain in the NC ($K_v = 0$). If the axis can follow the setpoint speed without increasing following error, then the output scaling is set properly.

Example

```

Increments per revolution = 4194304 [INC/rev]

Output Scaling = 0.9375 [s/INC]

Feed constant = 10mm/rev

Setpoint speed of 10 mm/s = 1rps = 60rpm

NSOLL_B = 0x003C0000 = 3932160

3932160 / 0.9375 [s/INC] = 4194304 [INC/s] = 1 * 2^22 =
1rps = 10mm/s

```

5.2 Using a Resolver

The encoder setup for ProfiDrives is done on the NC axis ProfiDrive tab. When using a resolver, then the radio button "Resolver (P1018)" has to be selected. By this selection the multiplier for the encoder lines is automatically preset with 0x0400 (dec. 1024). This factor (fine resolution, P1043) might be different for other drives than the 611u.

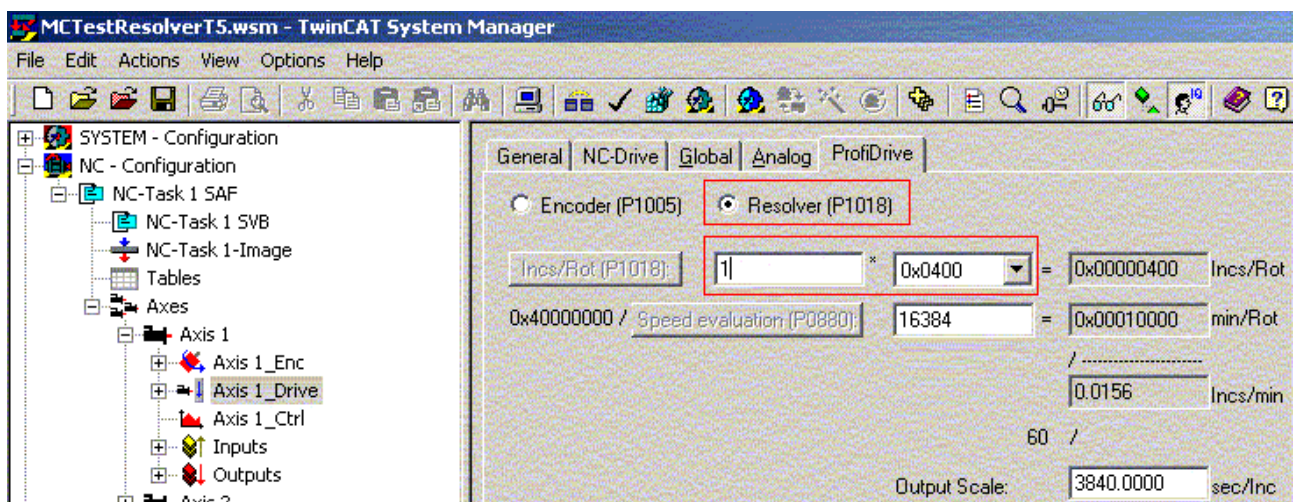
Additionally, the amount of pole pairs has to be set up for the calculation of the ProfiDrive Encoder Scaling. The amount of pole pairs is in the drive parameter P1018. The value of parameter P1018 can be looked up on the Drive Online tab and must be entered into the edit box beside "Incs/Rot (P1018)".

The ProfiDrive Velocity Scaling is in the drive parameter P880 and tells the NC about how to scale the velocity setpoint. The value of parameter P880 can be looked up on the Drive Online tab and has to be entered into the edit box beside "Speed evaluation (P0880)".

The System Manager currently might calculate the output scaling according to the following wrong formula:

```
Output Scale := 60 /
((P1018 * 0x0400) /
(0x40000000 / P880 ))
[sec/Inc] := [sec/min]
/ (([Inc/rot]) / ( 1 / [rot/min]))
```

This automatically calculated output scale, must be overwritten manually. Follow the steps in the chapters 5.2.1 to 5.2.3, then overwrite the output scale on the ProfiDrive tab with the manually calculated value. But any change of the parameters in the formula on the ProfiDrive tab forces automatically a new calculation of the output scale with the formula above. A manually entered output scale will be overwritten.



5.2.1 Calculate increments per revolution

The parameter P979 Encoder Format contains the information needed, to calculate the increments per revolution. To choose the proper sub index, it has to be distinguished between "IM" indirect measurement (on the motor, uses G1) and "DM" direct measurement (on the load, uses G2) and if the NC Reference System is set to "INC" incremental (uses XIST1) or "ABS"/"ABS MODULO" absolute (uses XIST2).

For simplification the following assumption are made:

- Gearbox ratio in the 611u is set 1:1 (P237, P238)
- XIST3 is not used

Depending on these two selections the formular to calculate the increments per revolution looks like one of the following:

```
Resolver on the motor:

Incremental Position (G1_XIST1)

Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Signal P979:4

Absolut Position (G1_XIST2)
```

```

    Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Abs P979:5

```

Resolver on the load:

```

    Incremental Position (G2_XIST1)

```

```

    Increments per revolution = Encoder Resolution P979:13 * 2^
Shift Factor Signal P979:14

```

```

    Absolut Position (G2_XIST2)

```

```

    Increments per revolution = Encoder Resolution P979:13 * 2^
Shift Factor Abs P979:15

```

Example Resolver 12bit (P1011.2 = 0) on the motor, incremental value, 11bit fine resolution (P979:4 = 11):

```

    Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Signal P979:4

```

```

    Increments per revolution = 0x00000400 * 2^11 = 2^10 *
2^11 = 2^21 = 2097152 = 0x00200000

```

Example Resolver 14bit (P1011.2 = 1) on the motor, incremental value, 11bit fine resolution (P979:4 = 11):

```

    Increments per revolution = Encoder Resolution P979:3 * 2^
Shift Factor Signal P979:4

```

```

    Increments per revolution = 0x00001000 * 2^11 = 2^12 *
2^11 = 2^23 = 8388608 = 0x00800000

```

5.2.2 Calculate output scaling

The output scaling on the ProfiDrive tab can be calculated in the following way:

```

Output
Scale = 60[s/min] / (IncPerRev / (0x40000000 /Speed Evaluation P880
[rev/min]))

```

Example

```

    Speed Evaluation P880 = 16384 = 0x00004000

```

```

    Increments per revolution = 8388608 = 0x00800000 INC/rev

```

Output

```

Scale= 60[s/min] / (0x00800000[INC/rev] /
(0x40000000 / 0x00004000[rev/min]))

```

```

    Output Scale= 60[s/min] /
128[INC/min] = 0.46875 [s/INC]

```

Example

```

    Speed Evaluation P880 = 16384 = 0x00004000

```

```

    Increments per revolution = 4194304 = 0x00400000 INC/rev

```

Output

```

Scale= 60[s/min] / (0x00400000[INC/rev] /
(0x40000000 / 0x00004000[rev/min]))

```

```

    Output Scale= 60[s/min] /
64[INC/min] = 0.9375 [s/INC]

```

5.2.3 Checkout output scaling

The test can only be done if the axis can move a short distance with constant velocity. Attention, if the scaling is wrong or the tuning is too aggressive, the axis might take off fast and slam hard into the bumper!



To check the output scale the NC axis has carefully to be moved by the NC with a slow speed, with no proportional gain in the NC ($K_v = 0$). If the axis can follow the setpoint speed without increasing following error, then the output scaling is set properly.

Example

Increments per revolution = 2097152 [INC/rev]

Output Scaling = 1.875 [s/INC]

Feed constant = 10mm/rev

Setpoint speed of 10 mm/s = 1rps = 60rpm

NSOLL_B = 0x003C0000 = 3932160

$3932160 / 1.875 \text{ [s/INC]} = 2097252 \text{ [INC/s]} = 1 * 2^{21} =$
1rps = 10mm/s

Example

Increments per revolution = 8388608 [INC/rev]

Output Scaling = 0.46875 [s/INC]

Feed constant = 10mm/rev

Setpoint speed of 10 mm/s = 1rps = 60rpm

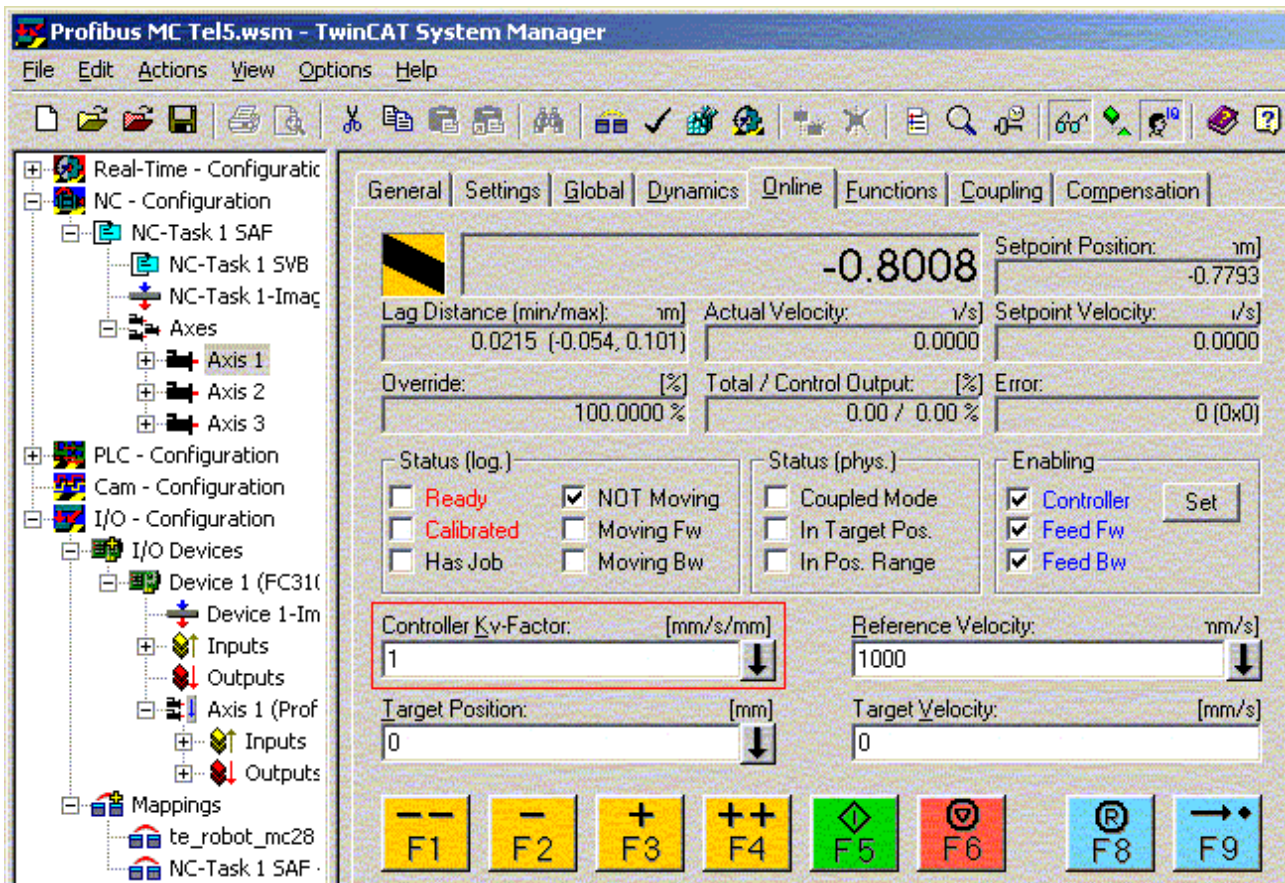
NSOLL_B = 0x003C0000 = 3932160

$3932160 / 0.46875 \text{ [s/INC]} = 8388608 \text{ [INC/s]} = 1 * 2^{23} =$
1rps = 10mm/s

6. Telegram Types 3, 5 (DSC) and 0 (Configurable)

6.1 Position Loop in the NC (Telegram 3 or 102)

The position loop gain is setup as Controller Kv-Factor on the NC axis online tab. For a closed position loop this parameter must be bigger than 0.



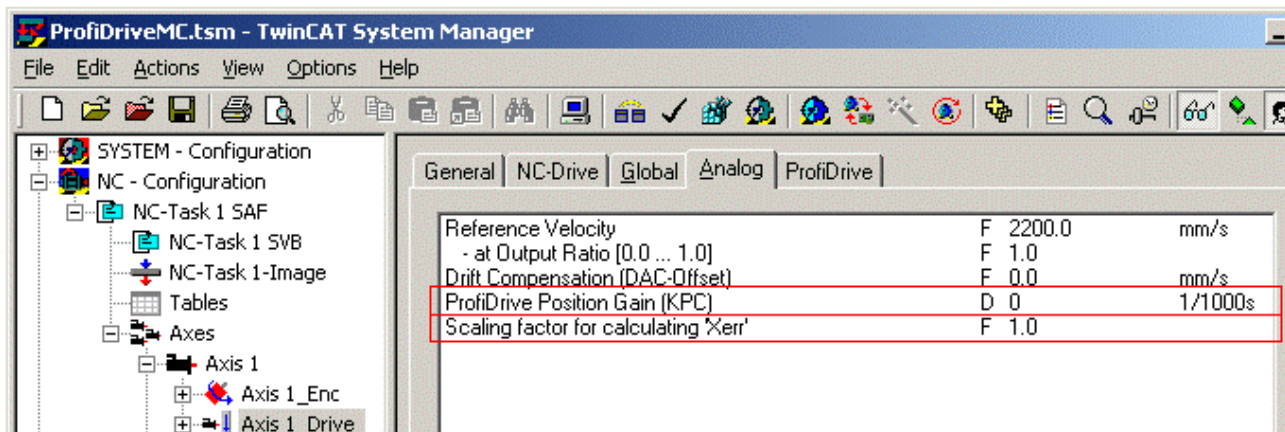
6.2 Position Loop in the Drive (Telegram 5 or 105 with Dynamic Stiffness Control)

In Telegram 5 or 105 there are the following error (position lag) and a position gain setpoint value parts of the setpoint telegram. The Dynamic Stiffness Control of the ProfiDrive uses those parameters to minimize the position error and to close the position loop in the drive.

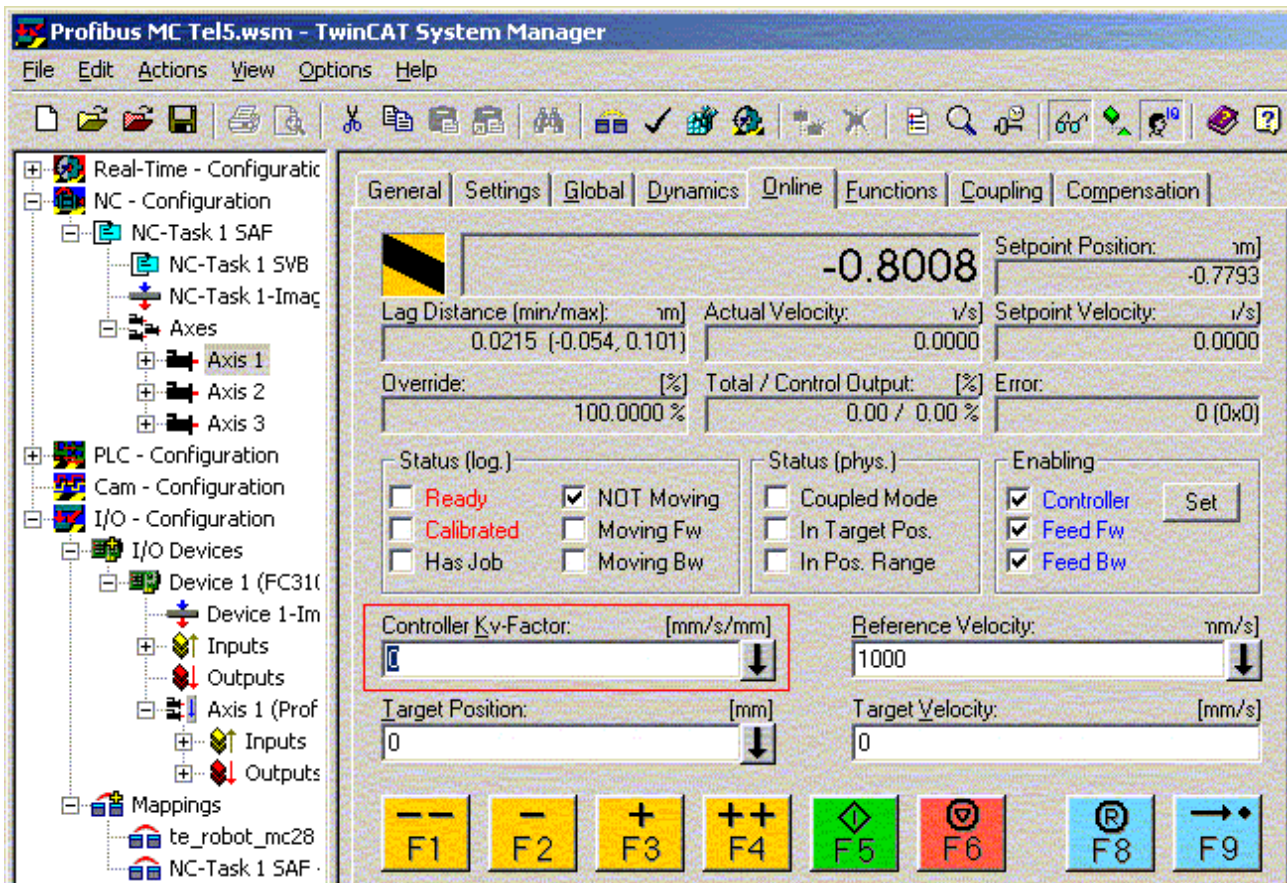
If the ProfiDrive Position Gain (KPC) is set to 0 then the DSC mode is switched off. If the ProfiDrive Position Gain (KPC) is bigger than the DSC mode is switched on. The KPC must be setup carefully because if the gain is too big, then the axis can start to vibrate violently. This could harm the operator or destroy the attached hardware.

To get a stiffer position control and a better positioning this KPC must be increased.

If the secondary encoder on the load is used (G2_XISTx) then the scaling factor for the following error Xerr must be setup properly since the drive internally has to convert the NC position to an internal scaling. If the primary encoder is used (on the motor shaft) then the scaling factor for the following error Xerr must be 1.



The NC runs open loop. The Controller Kv-Factor on the NC axis online tab can be set to 0. The position control is done in the drive.



6.3 Configurable Telegram 0

The telegram 0 should only be used to extend the standard telegrams 3 or 5 with additional cyclic data. In this case see for information in the chapters 6.1 (Telegram 3) or 6.2 (Telegram 5) above.

Information about setting up the configurable telegram in TwinCAT is in chapter "5. Configurable Telegram" of [TwinCAT ProfiDrive Configuration](#) [► 27].

Information about setting up the configurable telegram in SimoComU is in chapter "Telegram Type 0" in [SimoComU ProfiDrive Configuration](#) [► 53].

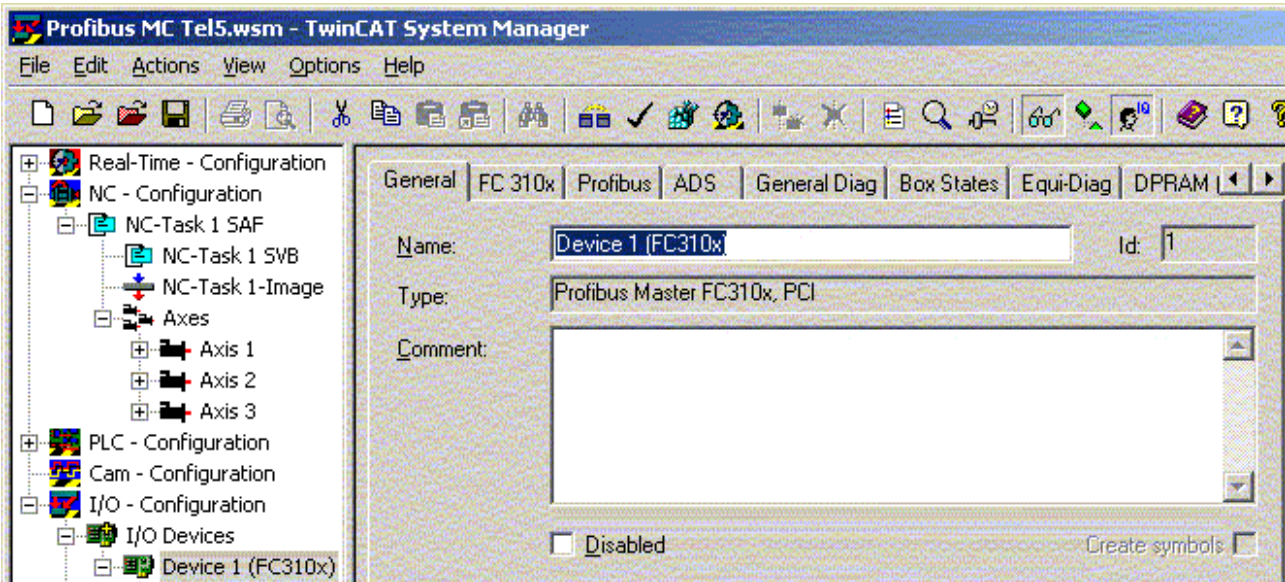
The Profibus telegram has to be setup in TwinCAT and SimoComU to the same content. The Profibus equidistant time has to be recalculated after all changes to the telegram, see [TwinCAT Profibus Master Configuration](#) [► 24].

5 TwinCAT IO Configuration

5.1 Profibus Master Card

5.1.1 Configuration of the Profibus Master

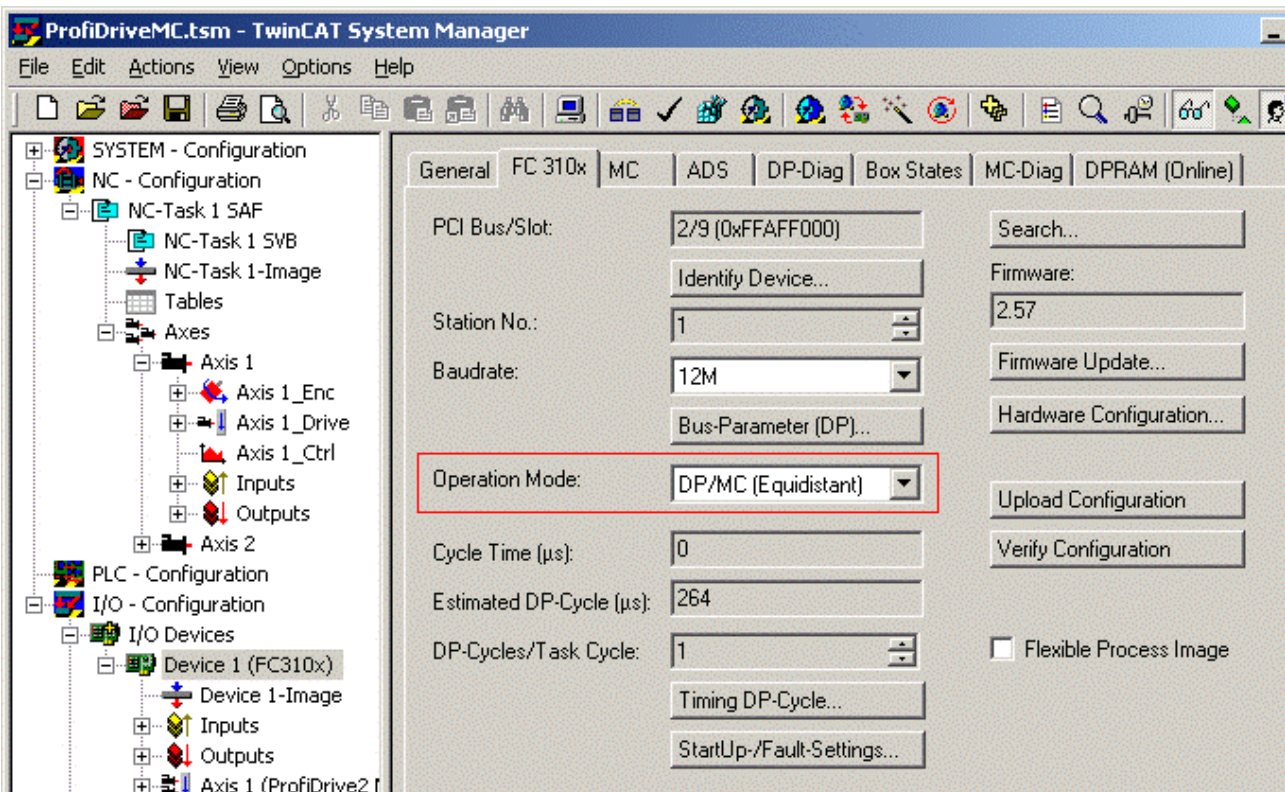
1. Add Profibus Master FC310x



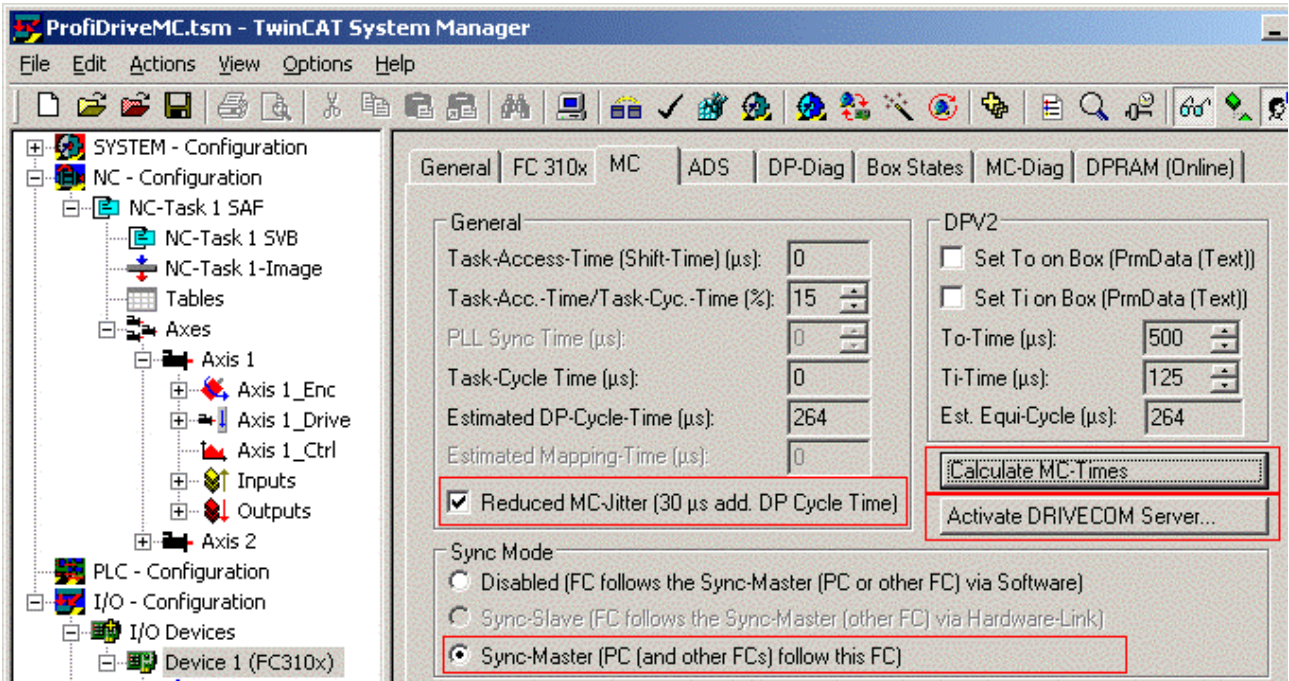
2. Setup Profibus Master Card

Select Operation Mode "DP/MC (Equidistant)" with 12 MBaud, e.g., Search for the IO address of the FC310x card.

The FC310x firmware version must be 2.56 (or higher).

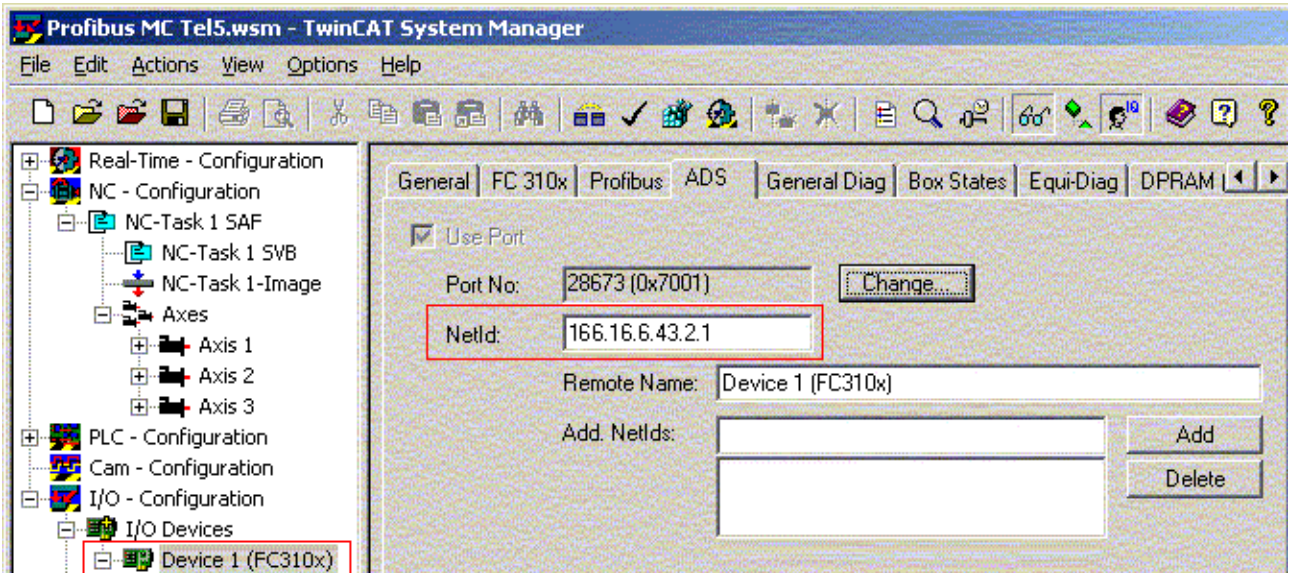


If drives are added or removed or the telegram type is changed, the button Calculate MC-Times needs to be pressed. The button Activate DRIVECOM server generates an XML file for the OpcDriveCom server. Additionally, the configuration tool for the OpcDriveCom server can be used. The FC3101 should be Sync Master unless there is a FC7501 Sercos Master in the I/O Configuration. In this case Sercos needs to be Sync Master and the Sync Mode must be disabled for the FC3101. The flag Reduced MC-Jitter needs to be selected to keep the GC-Jitter below 1000ns (see MC-Diag tab).



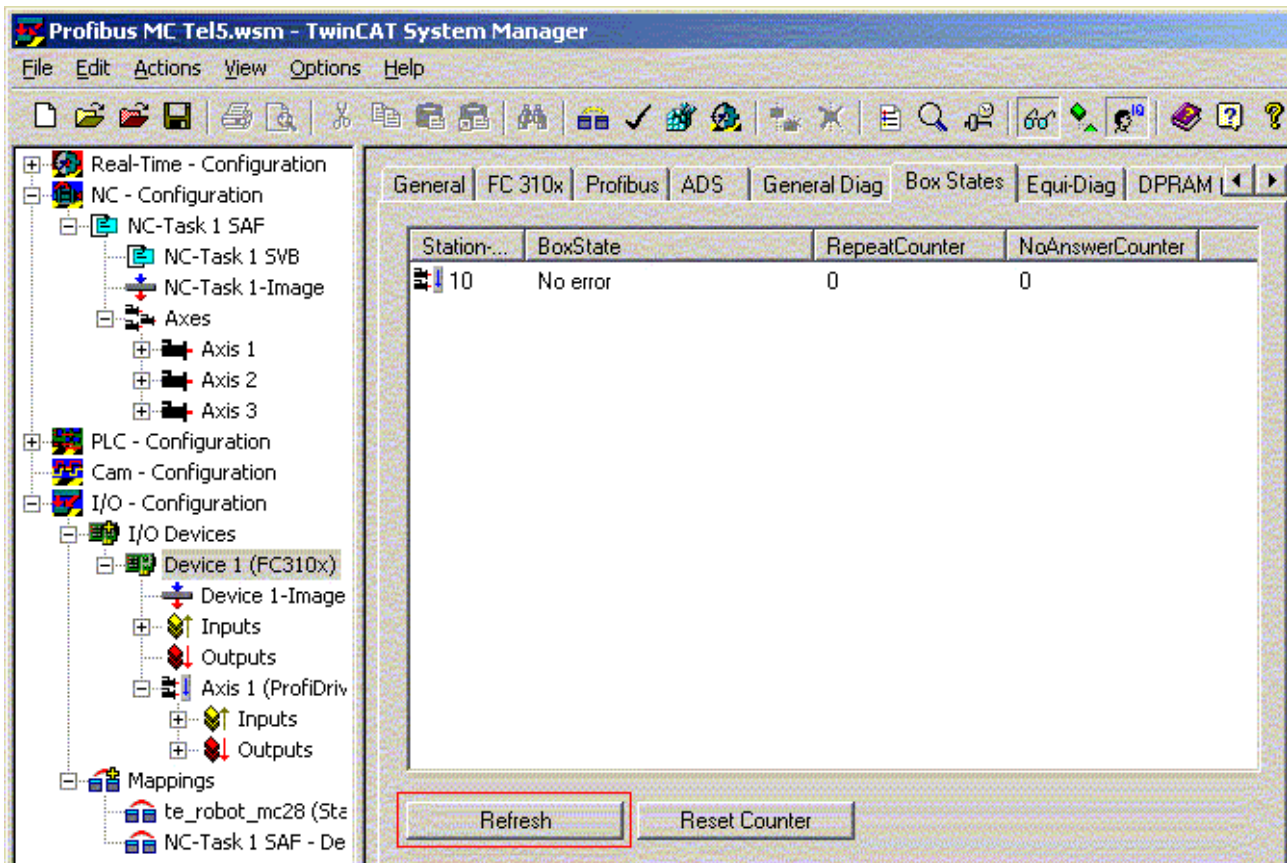
3. ADS-NetID

The ADS NetID is used for ADS communication to the Profibus card (e.g., from the PLC or OPC).

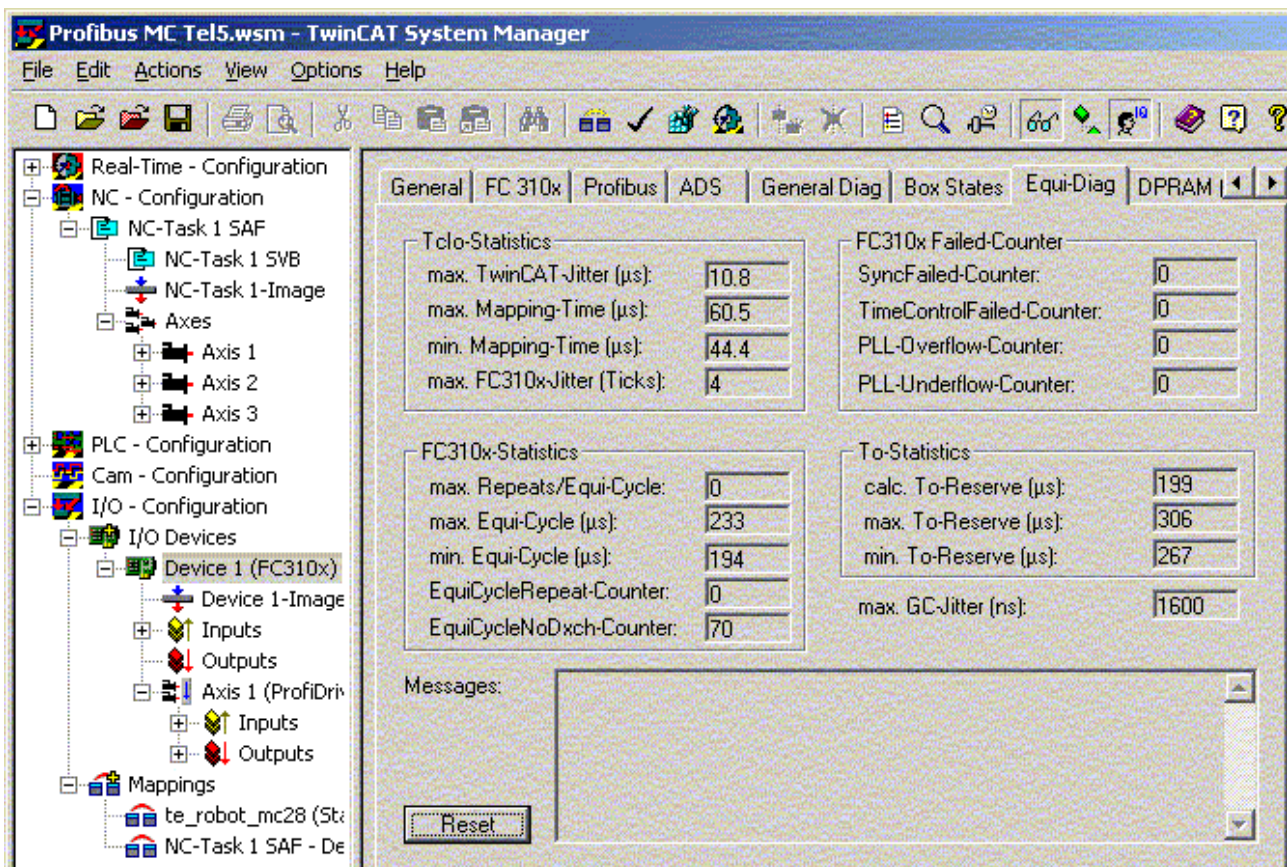


5.1.2 Diagnostic of the Profibus Master

Check for the box state "No error" for each drive once the TwinCAT System is running. The status is not updated automatically, therefore press the Refresh button for an update.



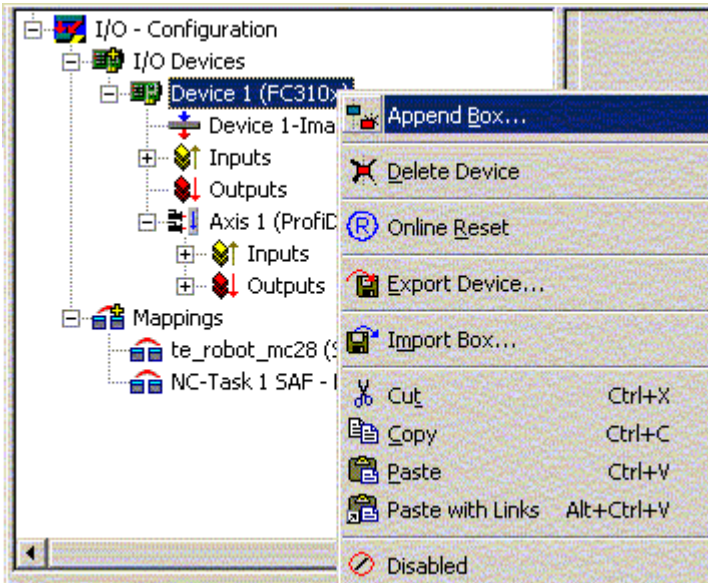
Check for Profibus MC problems on the Equi-Diag tab.



5.2 ProfiDrive

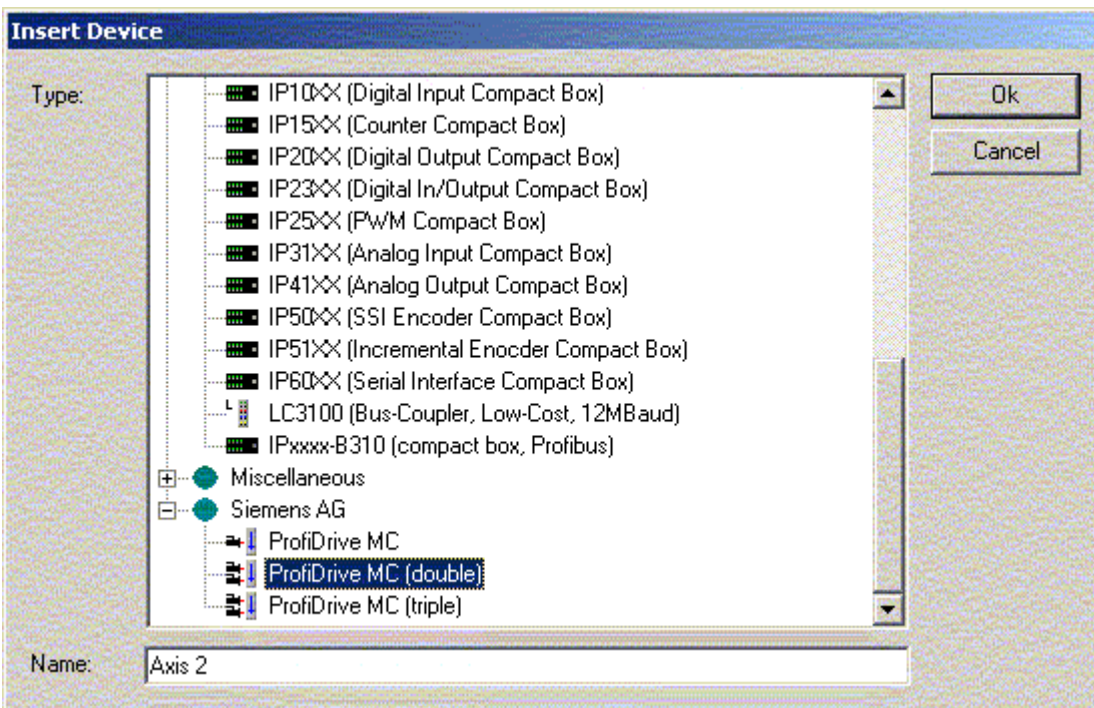
5.2.1 Configuration of ProfiDrives

1. Append a Box to the Profibus Master



2. Select the proper ProfiDrive

Choose either a single ProfiDrive MC or a double ProfiDrive MC form the Siemens AG folder.



3. Profibus Setup

Set the Profibus node address of the Profidrive and enable "DPV1-Class 2" service (for OPC).

4. Configure the Drive

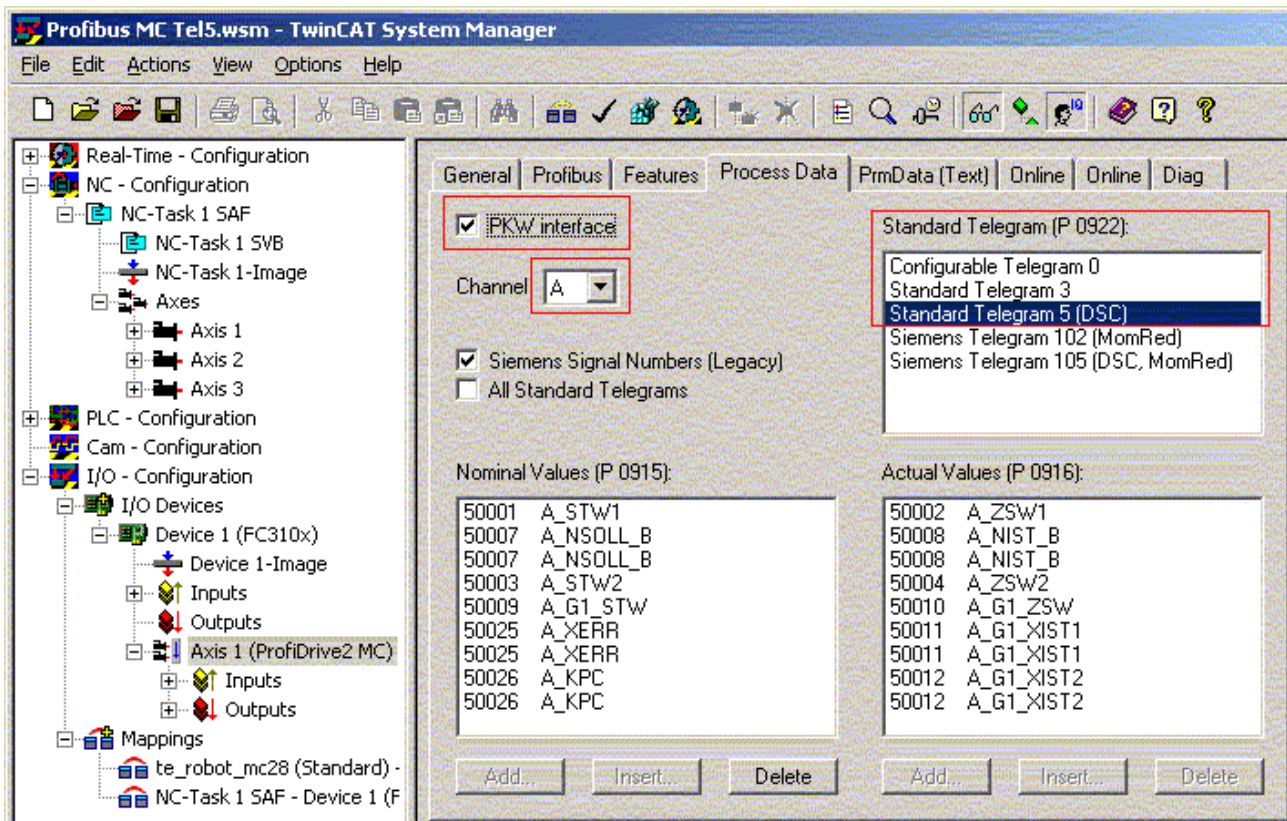
Enable the PKW interface (needed for parameter access from PLC or OPC). This is one setting for both drives of a double drive.



The NC axis is automatically unlinked if the telegram type changes and must be relinked, see [TwinCAT NC Configuration \[▶ 14\]](#).

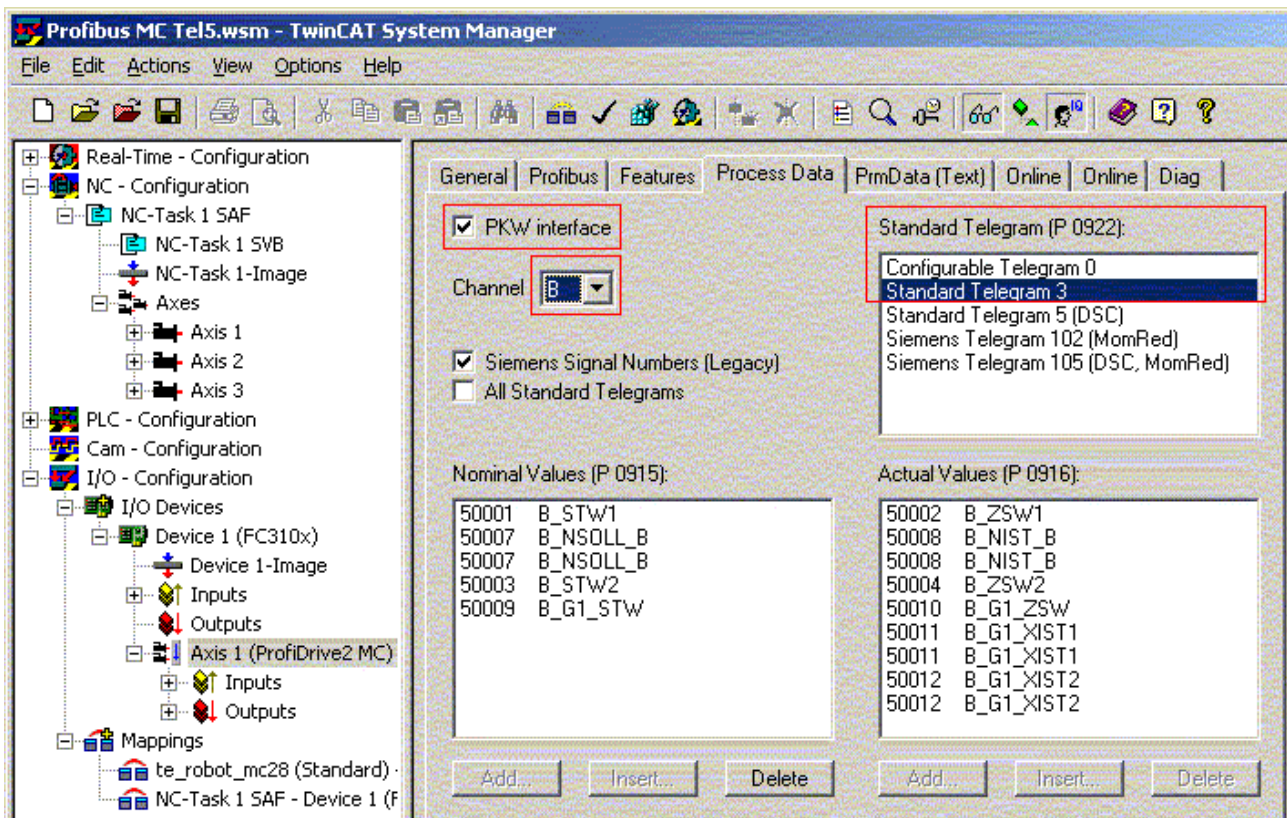
4.1 Cannel A Setup

Select the telegram type for Channel A (first drive of a dual drive), i.e., Standard Telegram 5 (DSC). The parameters of the nominal channel (P915) and of the actual value channel (P916) are modified automatically. Telegram type 0 allows for a user defined telegram but STW1 and ZSW1 are mandatory as first parameter in any case.



4.2 Channel B Setup

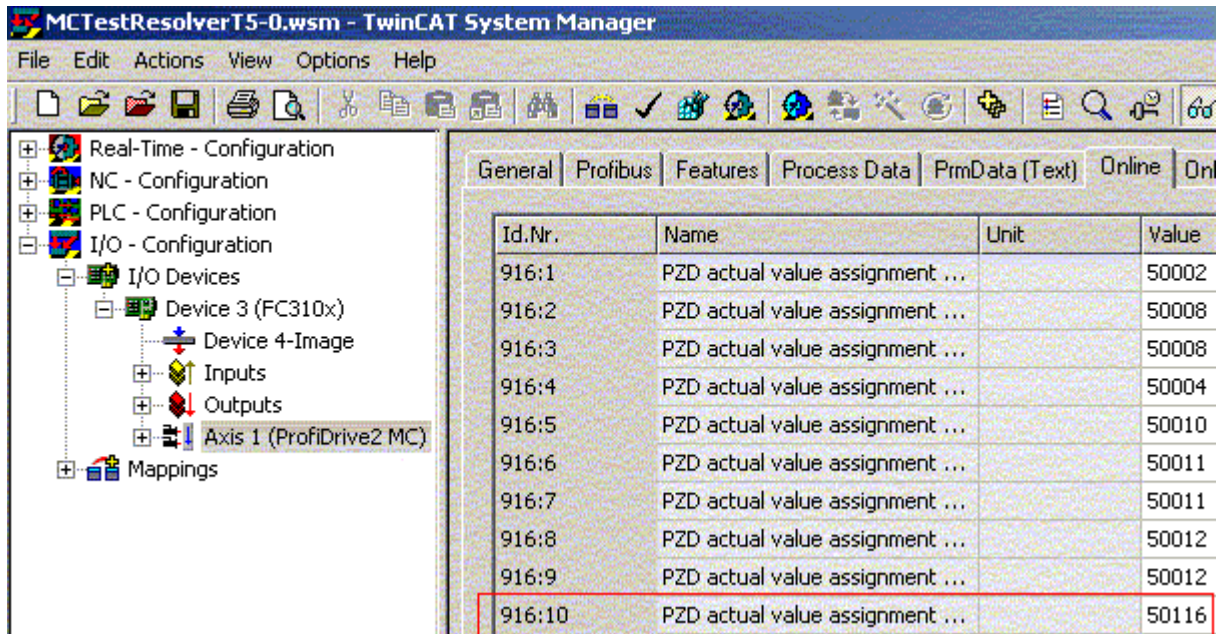
Select the telegram type for Channel B (second drive of a dual drive), i.e., Standard Telegram 3. The parameters of the nominal channel (P915) and of the actual value channel (P916) are modified automatically. Telegram type 0 allows for a user defined telegram but STW1 and ZSW1 are mandatory as first parameter in any case.



5. Configurable Telegram

5.1 Extend Telegrams

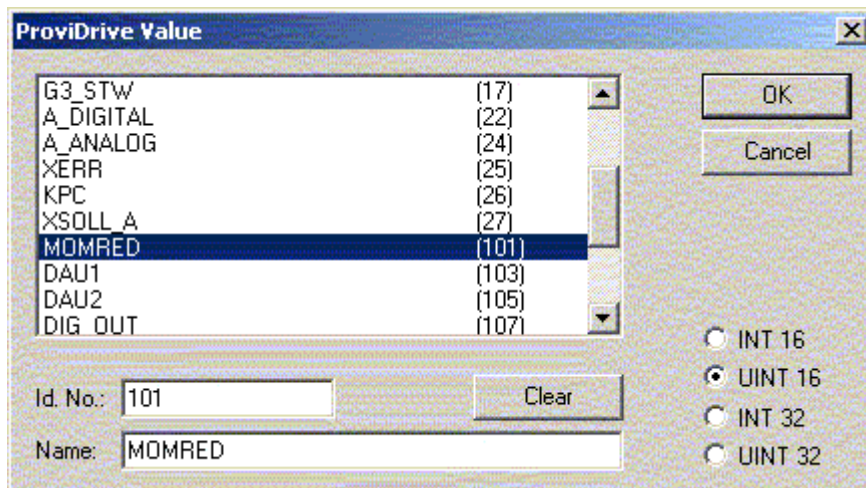
Add the additional parameters (like moment reduction and actual torque) to the drive with SimoComU first (see [SimoComU ProfiDrive Configuration](#) [▶ 53]). Then check for the Siemens parameter number online in the System Manager (i.e. 50116 = actual torque).



Change the telegram type from 3 to 0. Then the "Add..." buttons for the Nominal and the Actual Values are automatically enabled.

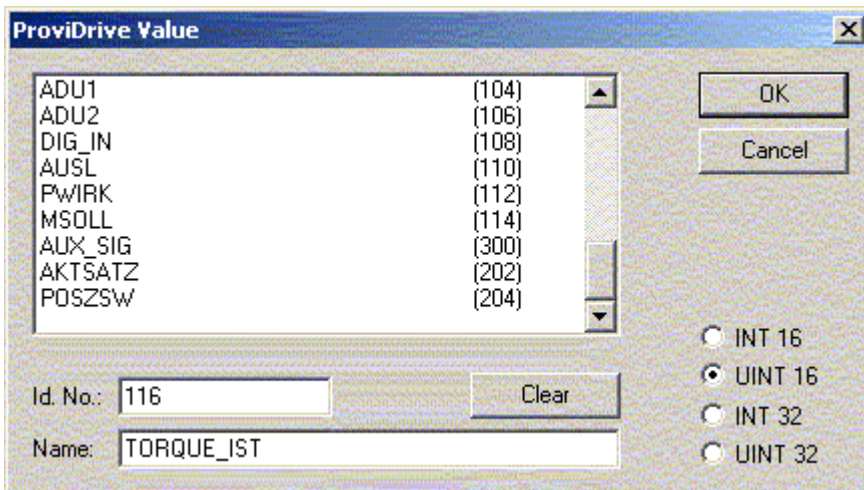
Press "Add..." of the Nominal Values and add parameter MOMRED (101). This parameter is in the list.

The channel identifier "A_" or "B_" and the 50000 to the parameter number are added automatically after pressing OK.

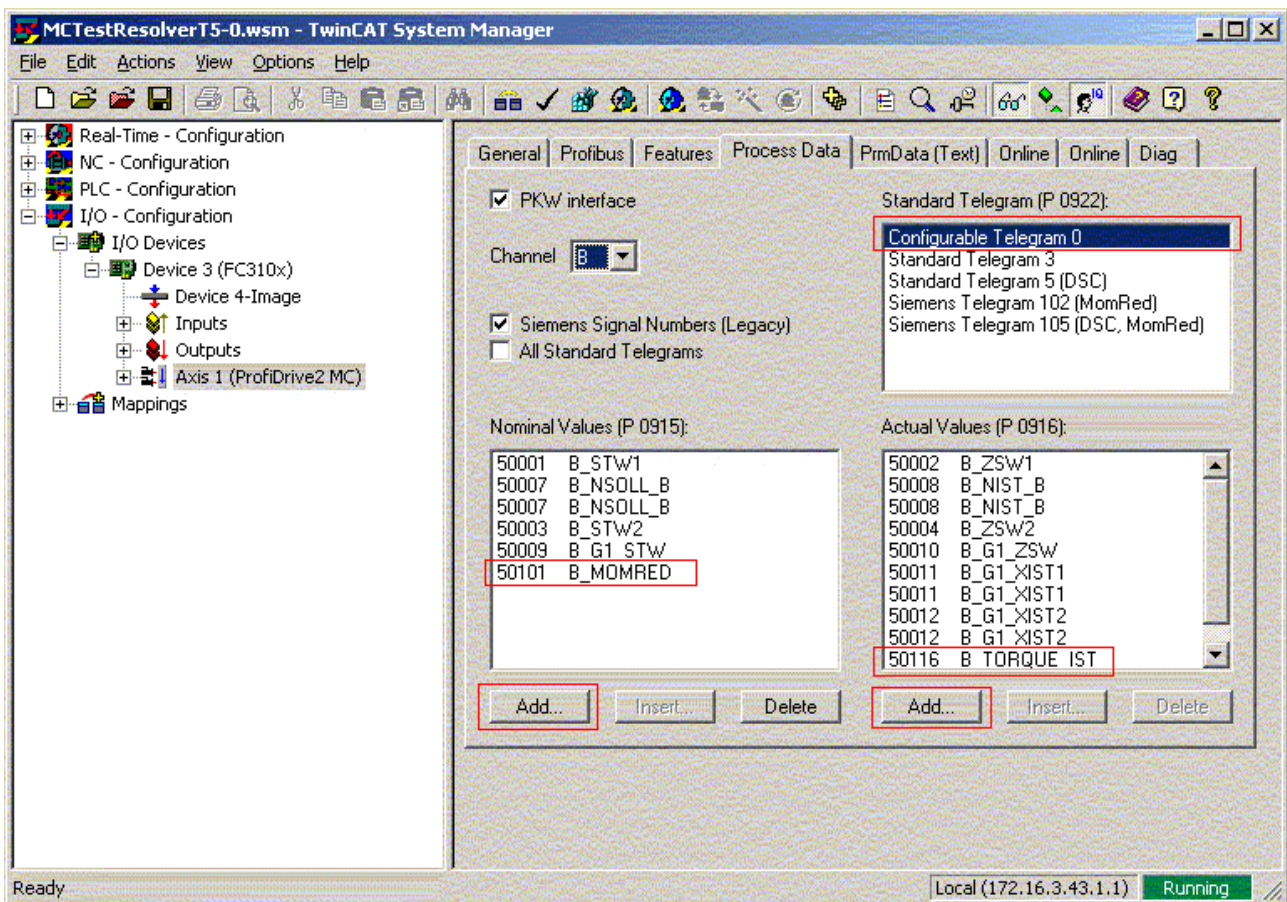


Press "Add..." of the Actual Values and add parameter TORQUE_IST (116). The proper data type must be selected. Look for parameter number and data type in SimoComU.

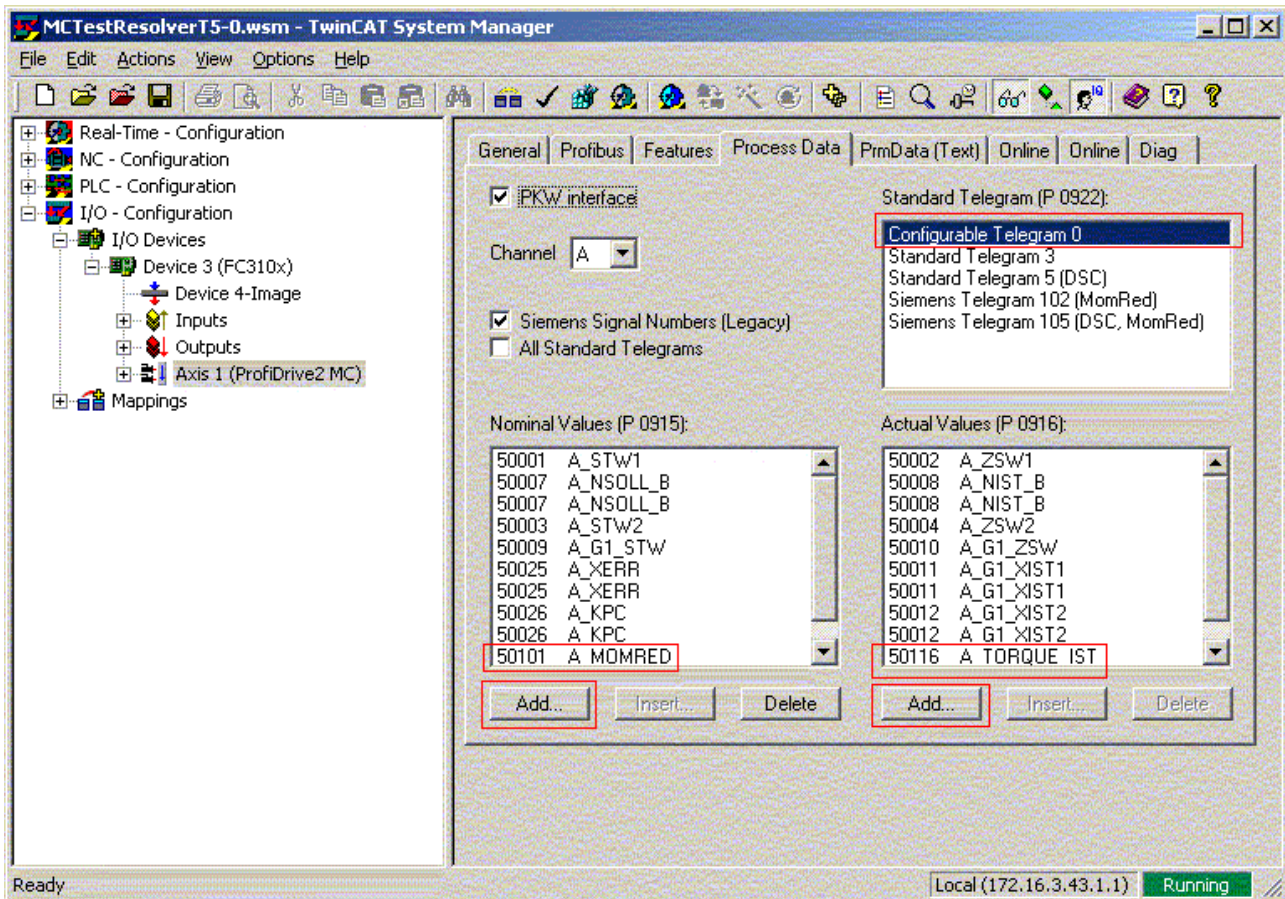
The channel identifier "A_" or "B_" and the 50000 to the parameter number are added automatically after pressing OK.



5.2 Extended Telegram 3

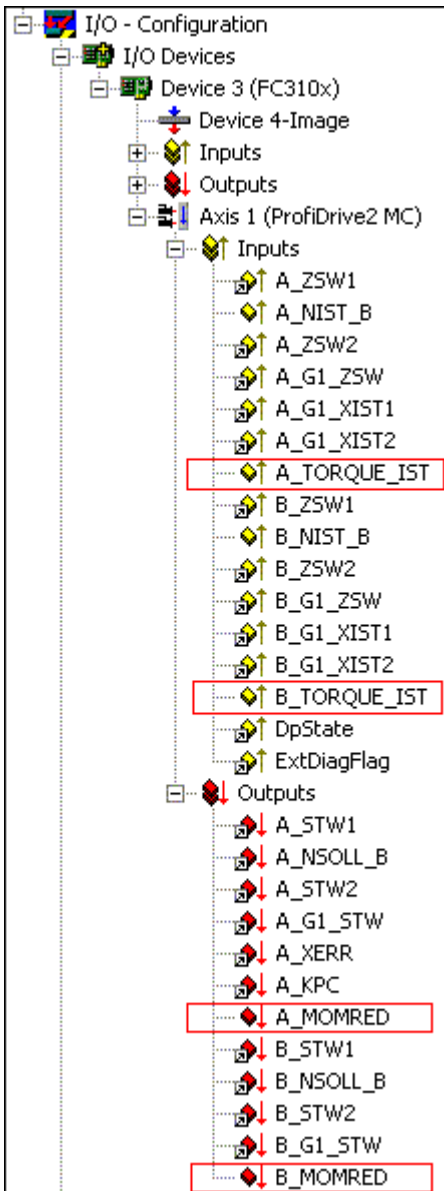


5.3 Extended Telegram 5



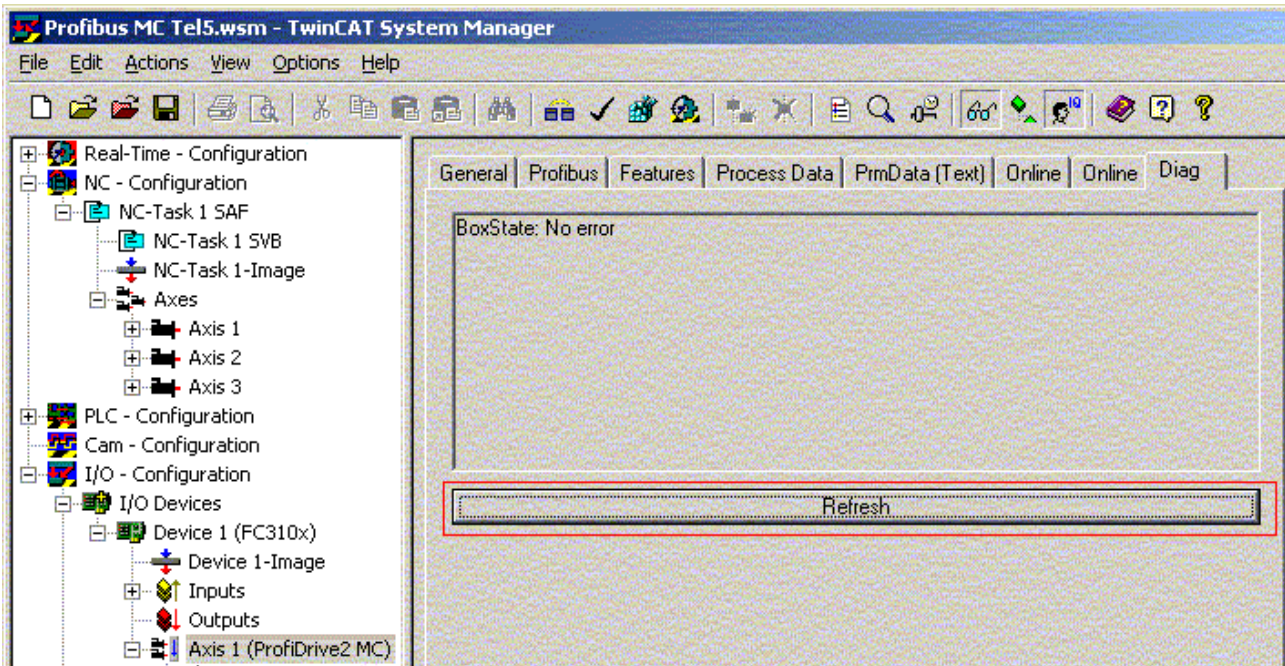
5.4 New cyclic Interface

Now the cyclic interface of the ProfiDrive contains the new data (i.e., for torque limiting and actual torque). These values can now be linked to the PLC.



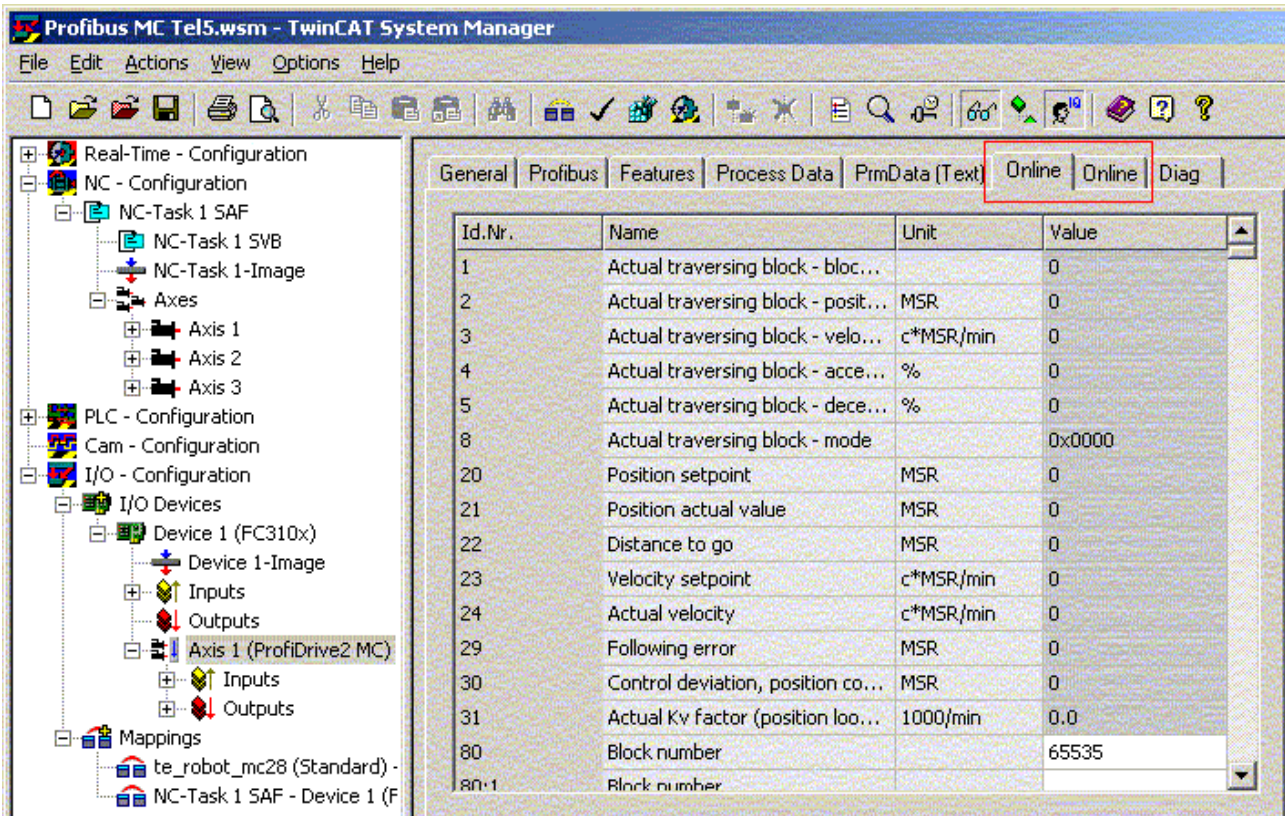
5.2.2 Diagnostic of ProfiDrives

Check for the box state "No error", e.g., press refresh to update the information.



To check or modify drive parameters online, TwinCAT needs the Firmware description file xxxx.acc, i.e., for firmware version 6.1.3 the file "V_611U_060103.ACC" in the folder "C:\TwinCAT\Io\Profibus\611u". If there is no file for the actual drive firmware, then this file is generated while going online to the drive with SimoComU (see "C:\Program Files\Siemens\SimoComU\Siemens\Acc").

Check for parameters of drive A online.



Check for parameters of drive B online.

The screenshot shows the 'Profibus MC Tel5.wsm - TwinCAT System Manager' window. The left sidebar displays a configuration tree with categories like Real-Time, NC, PLC, Cam, and I/O. The right pane shows the 'Online' tab with a table of system parameters.

Id.Nr.	Name	Unit	Value
1	Actual traversing block - bloc...		0
2	Actual traversing block - posit...	MSR	0
3	Actual traversing block - velo...	c*MSR/min	0
4	Actual traversing block - acce...	%	0
5	Actual traversing block - dece...	%	0
8	Actual traversing block - mode		0x0000
20	Position setpoint	MSR	0
21	Position actual value	MSR	0
22	Distance to go	MSR	0
23	Velocity setpoint	c*MSR/min	0
24	Actual velocity	c*MSR/min	0
29	Following error	MSR	0
30	Control deviation, position co...	MSR	0
31	Actual Kv factor (position loo...	1000/min	0.0
80	Block number		65535
80-1	Block number		

6 TwinCAT DriveCOM OPC Configuration

6.1 OPC Configuration

For requirements see [Installation Sequence \[▶ 8\]](#).

Creating a configuration for the TwinCAT DriveCOM OPC Server

General the TwinCAT DriveCOM OPC Server requires a XML based configuration file which contains information about available 611U drives.



The TwinCAT DriveCOM Configurator allows to scan the currently activated TwinCAT system for Siemens 611U drives and to create the XML configuration file for the DriveCom OPC Server. The DriveCOM configurator also supports the OLE-interface which allows other applications to remotely handle the functionality DriveCom Configurator.

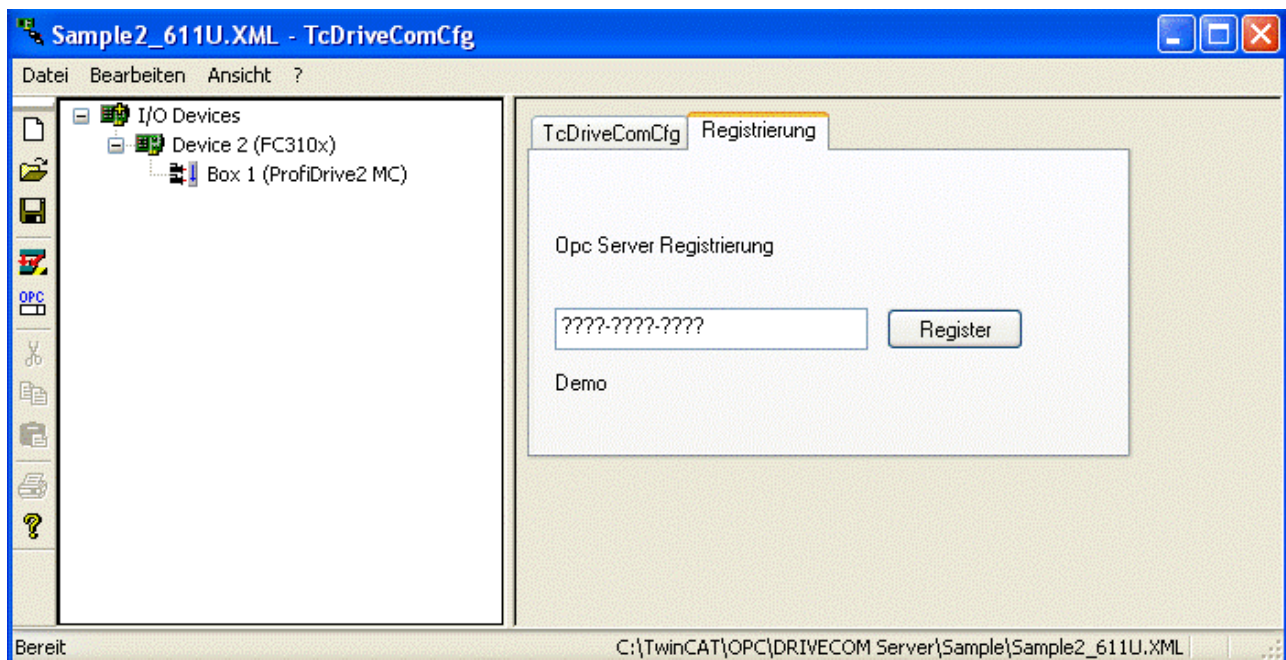
Requirements :


- FC310x Profibus Interface card and 611U drives are configured in TwinCAT System Manager
- The System Manager configuration is activated

Quick start

Three steps to do in the DriveCOM configurator

- Start the TwinCAT DriveCom Configurator
- Select  "ScanCurrentConfig". The configurator will scan the current activated TwinCAT system configuration "Currentconfig.xml" file for 611U drives and will display the results.
- Select  "Save As.." to save the scan-result in an TwinCAT DriveCOM-OPC-XML configuration file. The configurator will ask if this new created xml-file should be activated for the TwinCAT DriveCOM OPC Server.
The new OPC DriveCOM configuration gets valid with the next TwinCAT DriveCOM-OPC-Server start.



If different TwinCAT DriveCOM XML configuration files are existing a specific file can be activated with a click on  "Activate".






The TreeView :

Use the tree view to select Devices or Axes. When selected, you can check and edit the items properties (Displayed in the right pane).
When selecting the root item ("I/O Devices"), you can choose to register the DriveCom Product.

The Right Pane :

Use the Right Pane to view or edit Item Properties or register the DriveCom product.

The Toolbar :

	New File. Closes the current Document and creates a new one
	Import. Opens an Existing OPC Server configuration.
	Export. Creates an OPC Server configuration file.
	ScanCurrentConfig. Scans the current TwinCat Configuration.
	Activate. Choose an existing OPC Configuration and activate it.

6.2 Automation Interface

TcOPCDriveComCfg provides an Automation Interface to its Document, to expose its basic functionalities. The **ProgId** of the implementing class is "TcDriveComConfig.Document".

This interface inherits from IDispatch and is accessible both from full featured languages (e.g. VB or C++) and script languages (e.g. VBscript or Javascript).

Methods in VTable Order

Requirements

TcDriveComConfig.Document Methods	Description
ScanTwinCATConfig()	Scan the current TwinCAT configuration. Returns S_OK if successful or E_FAIL if an error occurred
OpenConfiguration(BSTR* Filename)	Open an existing configuration. Returns the number of imported items or -1 if an error occurred
SaveConfiguration(BSTR* Filename)	Exports the current Document to an OPC Server configuration. Returns the number of items exported or -1 if an error occurred
ActivateConfiguration(BSTR* Filename)	Activates an existing configuration file. True if succeeded, or False otherwise

VB Sample

```
Dim Filename As String
Filename = "C:\configuration.xml"

Set TcDrvComCfg = CreateObject("TcDriveComCfg.Document")

Call TcDrvComCfg.ScanTwinCATConfig
Call TcDrvComCfg.SaveConfiguration(Filename)
Call TcDrvComCfg.ActivateConfiguration(Filename)
```

6.3 Schema of DriveCOM OPC configuration file

A sample device block for a ProfiDrive with Profibus address 10 looks like this:

```
<TcOpcConfiguration xmlns="www.beckhoff.com/Schemas/TwinCAT/Opc/TcOpcSvrCfg">
  <Namespace>
    <Devices>
      <Device>
        <Name>dp2://brd0/seg0/dev10</Name>
        <AdsNetId>172.16.3.42.3.1</AdsNetId>
        <AdsPort>4106</AdsPort>
        <AutoCfg>9</AutoCfg>
      </Device>
    </Devices>
  </Namespace>
</TcOpcConfiguration>
```

Tag	Data	End Tag	Description
<Name>	dp2://brd0/seg0/dev10	</Name>	dev10 stands for the ProfiDrive with Profibus node address 10
<AdsNetId>	172.16.3.42.3.1	</AdsNetId>	ADS Net ID of the Profibus Master card, see ADS tab in TwinCAT Profibus Master Configuration [► 24]
<AdsPort>	4106	</AdsPort>	ADS port of the drive, this is: = 0x1000h + Profibus Node Address = 4096 + 10 = 4106
<AutoCfg>	9	</AutoCfg>	9: Siemens 611U Device activated for OPC 0: Siemens 611U Device deactivated for OPC

A sample device block for a ProfiDrive with Profibus address 11 looks like this:

```
<TcOpcConfiguration xmlns="www.beckhoff.com/Schemas/TwinCAT/Opc/TcOpcSvrCfg">
  <Namespace>
    <Devices>
      <Device>
        <Name>dp2://brd0/seg0/dev11</Name>
        <AdsNetId>172.16.3.42.3.1</AdsNetId>
        <AdsPort>4107</AdsPort>
        <AutoCfg>9</AutoCfg>
      </Device>
    </Devices>
  </Namespace>
</TcOpcConfiguration>
```

Tag	Data	End Tag	Description
<Name>	dp2://brd0/seg0/dev11	</Name>	dev11 stands for the ProfiDrive with Profibus node address 11
<AdsNetId>	172.16.3.42.3.1	</AdsNetId>	ADS Net ID of the Profibus Master card, see ADS tab in TwinCAT Profibus Master Configuration [► 24]
<AdsPort>	4107	</AdsPort>	ADS port of the drive, this is: = 0x1000h + Profibus Node Address = 4096 + 11 = 4107
<AutoCfg>	9	</AutoCfg>	9: Siemens 611U Device activated for OPC 0: Siemens 611U Device deactivated for OPC

Sample

A complete sample for the XML-File may look like this.



Additional, not documented information in the XML file are just optional for the DriveCom configurator.

```
<TcOpcConfiguration xmlns="www.beckhoff.com/Schemas/TwinCAT/Opc/TcOpcSvrCfg">
  <Namespace>
    <Devices>
      <Device>
        <Name>dp2:/brd0/seg0/dev11</Name>
        <AdsNetId>172.16.3.42.3.1</AdsNetId>
        <AdsPort>4107</AdsPort>
        <AutoCfg>9</AutoCfg>
        <ExName>Device 2 (FC310x)</ExName>
        <Type>38</Type>
        <Box>
          <Name>Box 1 (ProfiDrive2 MC)</Name>
          <Type>1012</Type>
        </Box>
      </Device>
    </Devices>
  </Namespace>
</TcOpcConfiguration>
```

7 OPC Client (Diagnostic & Recipe)

This TcOpcClient has been developed to assist in the test and development of our OPC Data Access 1.0 and 2.0 Servers. This text assumes that you are using Windows 95/98 or Windows 2000/NT 4.0 (Service Pack 4 recommended).

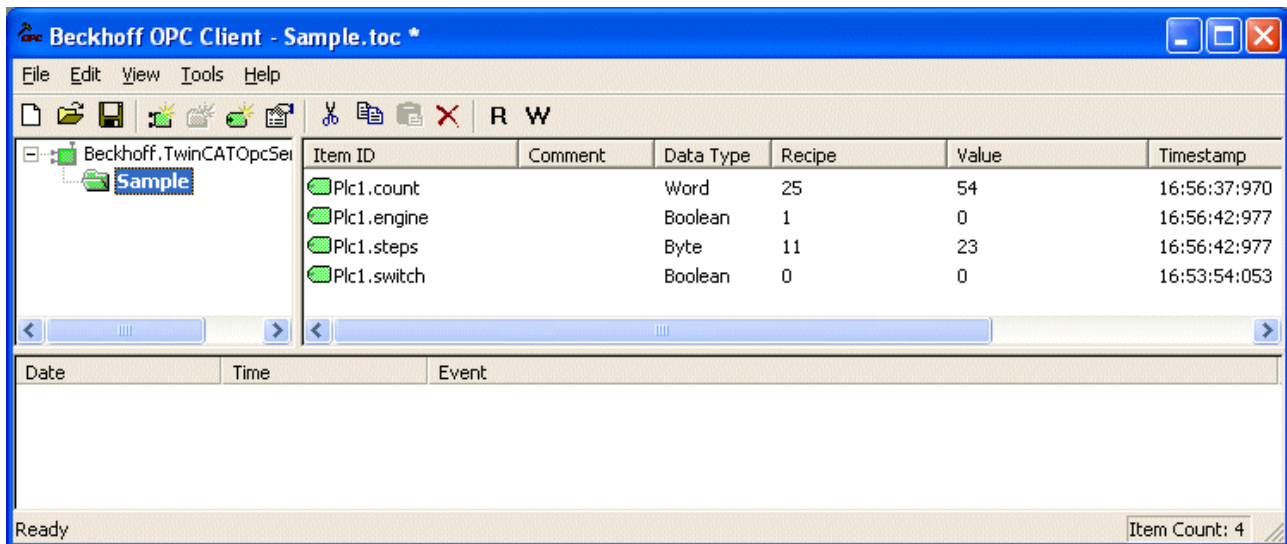
The TcOpcClient supports both local and remote OPC server connections. Remote connections are handled through the operating system's DCOM interface. Windows 95 users should note that Microsoft provides a special update patch that fixes problems with the original COM/OLE logic that shipped with the operating system. In addition, this patch provides the DCOM support necessary for remote server access that was not implemented in the operating system.

Client Preparation

Begin by creating a [server connection](#) [▶ 41]. A server connection is used to connect to an OPC server. Once this connection is made, a [group](#) [▶ 44] can be added to the connection with varying properties such as update rate, dead band, and time bias. Finally, [items](#) [▶ 46] can be added to the individual groups. These items have properties such as an initial active state, data type and access path. Active items will automatically receive data change notifications and will display its current value and quality in the item view.

7.1 The Main Window

Here is a view of the application.

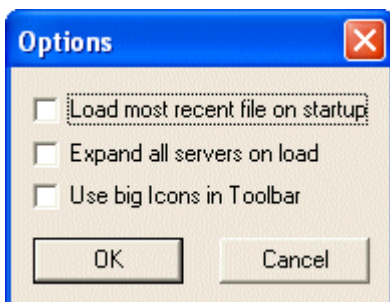


Title Bar












The application title bar will display the name of the loaded project file. A * following the name indicates that it is modified.

Client Configuration

To configure the Beckhoff OPCClient select **Options** from the **Tools** menu:



Toolbar

-  Creates a New project
-  Opens an existing project from disk
-  Saves the current project to disk
-  Create a new [server connection](#) [▶ 41]
-  Create new [group](#) [▶ 44]
-  Create new [item](#) [▶ 46]
-  Edit properties of the selected server, group or item
-  Cut the current selection to the clipboard
-  Copy the current selection to the clipboard
-  Paste a server, group or item(s) from the clipboard
-  Delete the current selection

- R** Read recipe values

- W** Write recipe values

Group Window

This window manages a list of [server connections](#) [▶ 41] along with their [group](#) [▶ 44] objects. Right clicking on a server/group in the list will display a menu of options applicable to the server/group. Double clicking will display the property sheet for the server/group.

Item Window

This window displays a list of [item](#) [▶ 46] information for the selected group. Right clicking on an item name in the list will display a menu of options applicable to the item. Double clicking will display the properties dialog for the item.

Clicking on the Item ID column heading will cause the item list to be sorted based on Item ID. Moving the mouse over the header for the column that is to be changed and dragging the left or right end of the header button until the column is the desired size can change column widths.

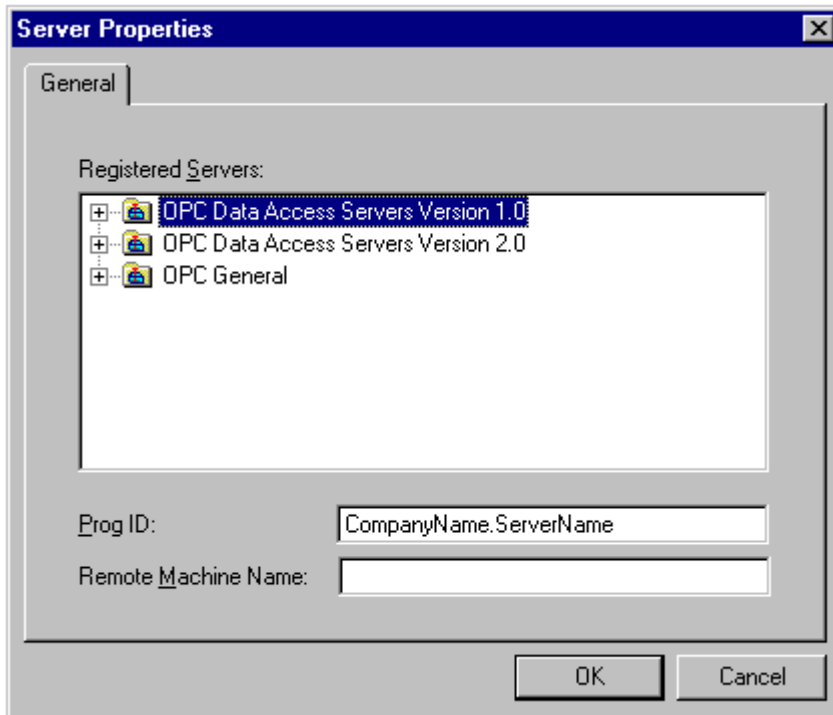
Message Log

This window logs status messages generated by the application. As with the item window, the column headers may be resized. This window does not support sorting.

7.2 Server Connection

A server connection provides a link between an OPC server and this client. Through this connection, [groups](#) [▶ 44] will be added.

Select **NewServer...** from the **Edit** menu or click the toolbar button to create a new server connection using the following property sheet:



Prog ID

Specify the Prog ID of the OPC Server the client should connect to. You can browse for registered servers by expanding any of the following branches:

OPC Data Access Servers Version 1.0 - Data Access 1.0 servers should self-register and add their Prog ID to this component category. Servers that are properly registered will be listed under this branch.

OPC Data Access Servers Version 2.0 - Data Access 2.0 Servers should self-register and add their Prog ID to this component category. Servers that are properly registered will be listed under this branch.

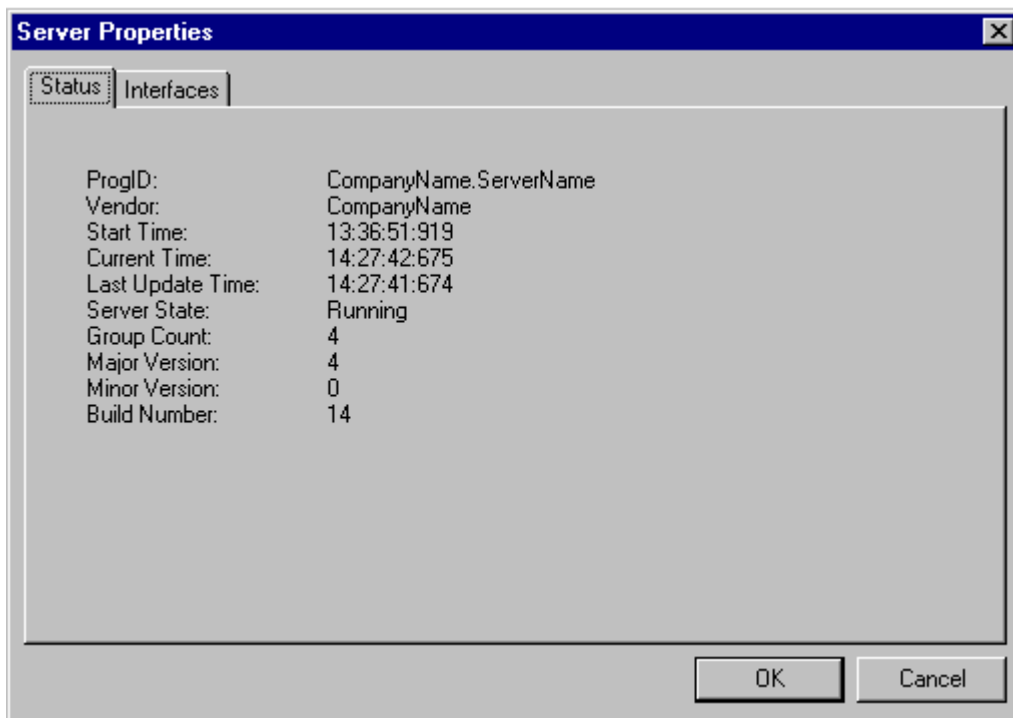
OPC General - All Servers should add a special OPC key in the system registry to be identified as an OPC server. This method allows for older clients and servers to be used (the preferred method is to use component categories). Servers that are registered with this key will be listed under this branch.

Double-clicking on any registered server will automatically update the Prog ID field.

Remote Machine Name

Specify the name of the machine the OPC server (specified by the Prog ID) resides on. If the server is located on the same machine as the client, leave this field blank.

Once the client makes a successful connection to a server, invoke the server properties by selecting **Properties...** from the **Edit** menu to view the server status and the supported server interfaces.



The server status page details the status of the server. The client queries the status of the server and obtains the following information:

Vendor – A String that specifies vendor specific information.

Start Time - Time the server application was started.

Current Time - Current Time as known by the server.

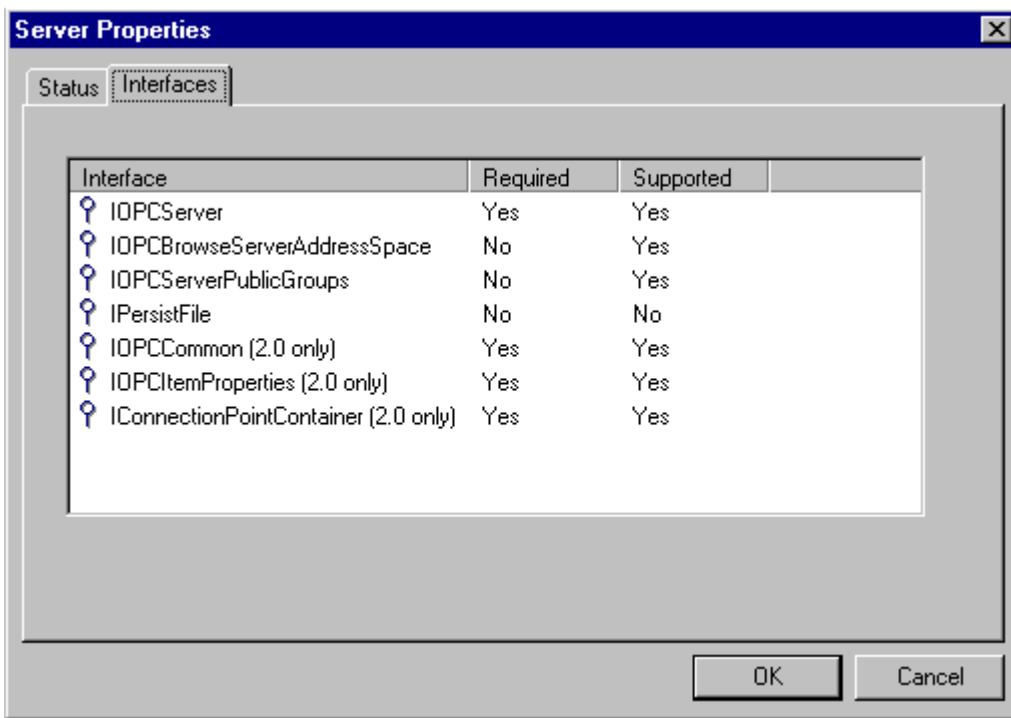
Last Update Time - Time the server sent the last data update to the client on this connection.

Server State - The current state of the server. Valid states are Running, Failure, No Configuration, Suspended, and Test.

Major Version - Major version of the server software.

Minor Version - Minor version of the server software.




Build Number - Build number of the server software.



This interface page lists the interfaces that are required at the server level. Interfaces not required are considered optional. The "supported" column states which interfaces this server supports.

Visual/Operational Changes

When the TcOpcClient adds, connects, or disconnects a server connection you will notice a change in the appearance of the server connection. The image that appears to the left of each server connection will change to one of the following:

-  The client is connected to the server.
-  The client is disconnected from the server.
-  The client could not connect to the server (the server may not be properly registered).

7.2.1 Group

A group is used to organize a collection of [items](#) [▶ 46] with a common set of properties. The group also specifies the following properties: group name, update rate, time bias, percent dead band, language ID, active state, and the type of data connection that should be made to the server.

Select **NewGroup...** from the **Edit** menu or click the toolbar button to create a new group using the following property sheet:

The screenshot shows a 'Group Properties' dialog box with two tabs: 'General' and 'Interfaces'. The 'Interfaces' tab is selected. The dialog contains the following fields and controls:

- Name:** Text box containing 'GroupA'
- Update Rate (ms.):** Text box containing '10'
- Time Bias (min.):** Text box containing '0'
- Percent Deadband:** Text box containing '0'
- Language ID:** Text box containing '1033'
- Update Notification:** Dropdown menu set to 'OPC 2.0' and a checked checkbox for 'Active State'
- Buttons:** 'OK', 'Cancel', and 'Apply' buttons at the bottom right.

Name

Enter a name to identify the group. If no name is entered, it is the responsibility of the OPC Server to generate a unique name for you.

Update Rate

Specifies how often, in milliseconds, the OPC server should provide updates for changing data.

Time Bias

Specifies the time difference in minutes between the client/server and the actual device. The information allows the client to convert the timestamp received by the server back to the local time of the device.

Percent Dead band

Specifies the percent change in data required to notify the client of a data change.

Language ID

Specifies the language to be used by the server when returning values as text for operations on this group.

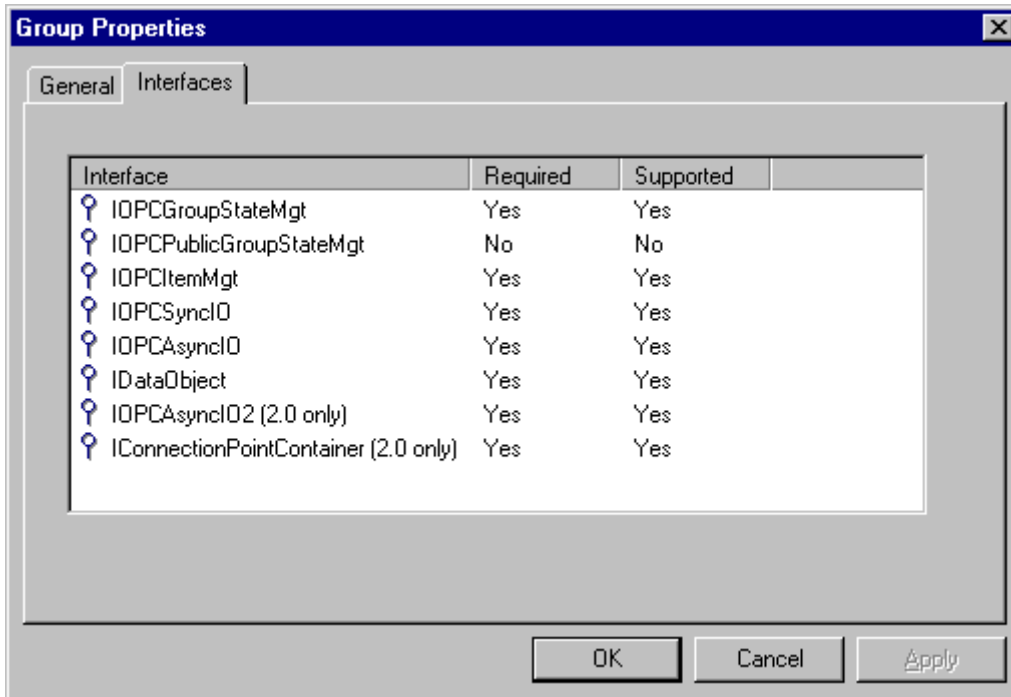
Active State

Specifies the active state of the group. When the group is active, the client will receive data change updates for all active items at the specified update rate.

Update Notification

Specifies the method to use when receiving data change notifications, or initiating asynchronous requests. Valid selections are OPC 1.0 (No Timestamp), OPC 1.0 (With Timestamp) and OPC 2.0. Data Access 2.0 servers automatically supply timestamps with all data transactions.

When the group has been successfully added to the project, invoke the group properties by selecting **Properties...** from the **Edit** menu to modify group properties and view the supported group interfaces.



This interface page lists the interfaces that are required at the group level. Interfaces not required are considered optional. The supported column states which group interfaces are supported by server.

Visual/Operational Changes

When the TcOpcClient adds, activates or inactivates a group you will notice a change in the appearance of the group. The image that appears to the left of each group will change to one of the following:

 The group is active.

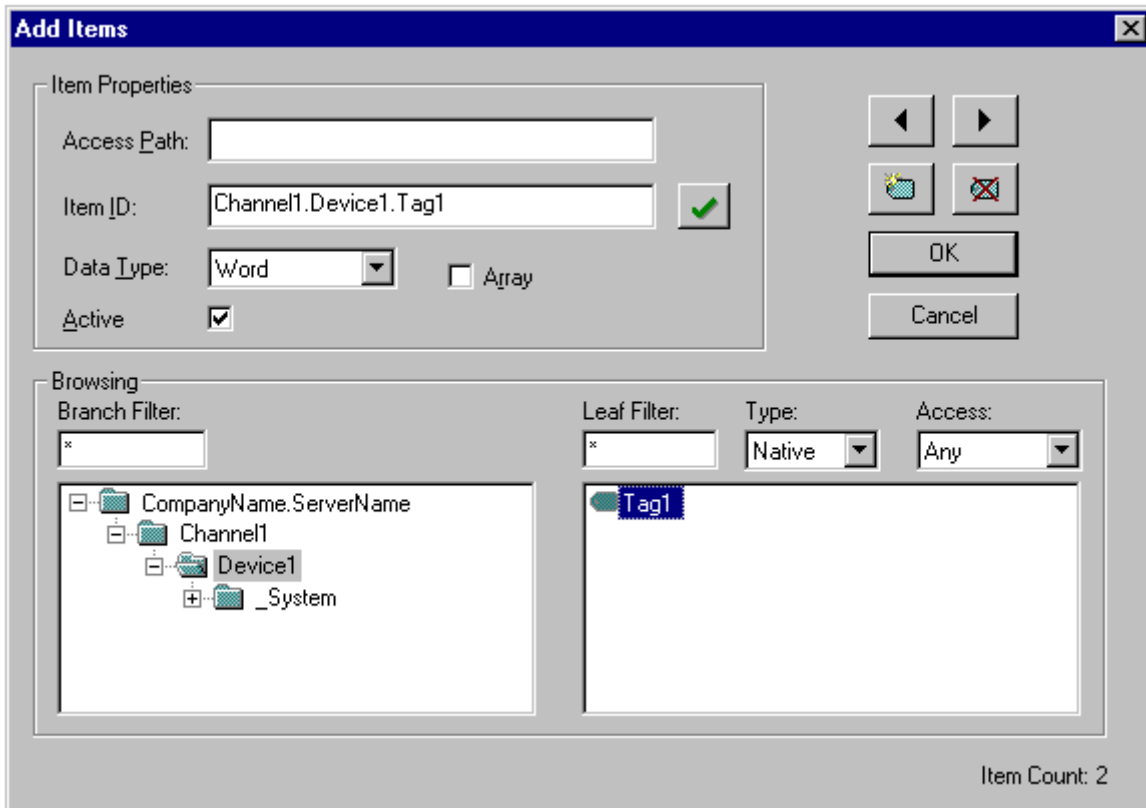
 The group is inactive.

 The client could not add the specified group to the server connection.

7.2.2 Items

Items represent data that may be accessed via an OPC server. An item specifies the following properties: item ID, access path, requested data type, and active state.

To add an item to a group select **NewItem...** from the **Edit** menu or click on the toolbar button to define an item using the item editor dialog box:



Access Path

Required by some OPC servers to complete an item definition. Refer to your OPC server's documentation to determine whether you need to specify an access path.

Item ID

The OPC server item used to reference the data. Refer to your OPC server's documentation to determine valid item names for the location in question. If the server supports tag browsing then you can select an item by using the browse controls.

Data Type

The requested data type should be used when communicating between the OPC server and the OPC Quick Client. This should be specified to agree with the size and type of the register or memory location that is being addressed. Supported data types are defined as follows:

Data Type	Description
Native	Default as determined by the OPC server
Boolean	Single bit
Char	Signed 8 bit value
Byte	Unsigned 8 bit value






Data Type	Description
Short	Signed 16 bit value
Word	Unsigned 16 bit value
Long	Signed 32 bit value
DWord	Unsigned 32 bit value
Real	Single precision floating point value. (32 bits)
Double	Double precision floating point value (64 bits)
String	Zero terminated character array.

Check the Array box if the data type is an array type.

Active State

Specifies the initial active state for the item when adding the item. The state can be changed later as described later on in this topic.

Button Definitions




-  Applies changes to the current tag and fills the dialog with properties of the previous tag in the list.
-  Applies changes to the current tag and fills the dialog with properties of the next tag in the list. If no next tag exists, the client attempts to auto-increment the current item ID.
-  Creates a new item definition.
-  Deletes the current item definition.
-  Validates the current item definition.

Browsing

If the server supports browsing, the browsing controls will be available for use. Browse the branch list to search for selected items. Apply appropriate filtering to simplify the search.

Visual/Operational Changes

When the TcOpcClient adds, activates or inactivates an item you will notice a change in the appearance of the item. The image that appears to the left of each item will change to one of the following:

-  The item is active.
-  The item is inactive.
-  The client could not add the specified item to the group.

Recipes

For each item, a recipe value may be specified, by selecting **Set recipe** from the **Tools|Item** menu. You may also choose to read recipes for a whole group, by choosing **Read recipes** from the **Tools|Group** menu. Later on you may write the whole recipe for one group down to the PLC. Reading and writing of recipes may be accelerated by selecting a group and pressing **<Strg + Leftarrow>** for reading or **<Strg + Rightarrow>** for writing Group recipes.

Comments

Each Item has associated with it a comment. You can use this value to store any item specific data as you desire.

7.3 Operations

Server Connection Operations

Connect

Select **Connect** from the **Tools|Server** menu to reestablish a connection to the server. All groups and items will also be added.

Disconnect

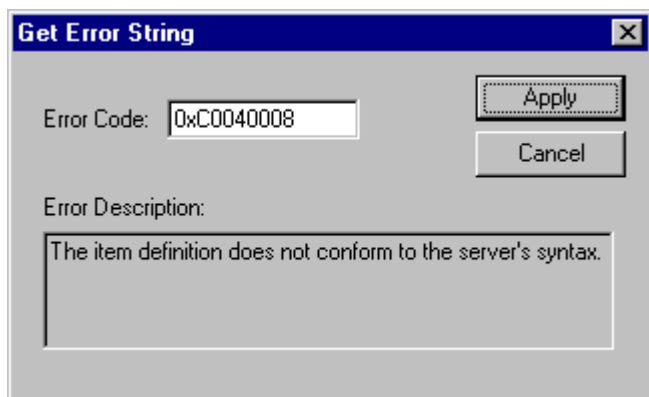
Select **Disconnect** from the **Tools|Server** menu to disconnect from the server.

Reconnect

Select **Reconnect** from the **Tools|Server** menu to reestablish a connection to the server.

Get Error String

Select **Get Error String...** from the **Tools|Server** menu to obtain an error description for any valid error codes.

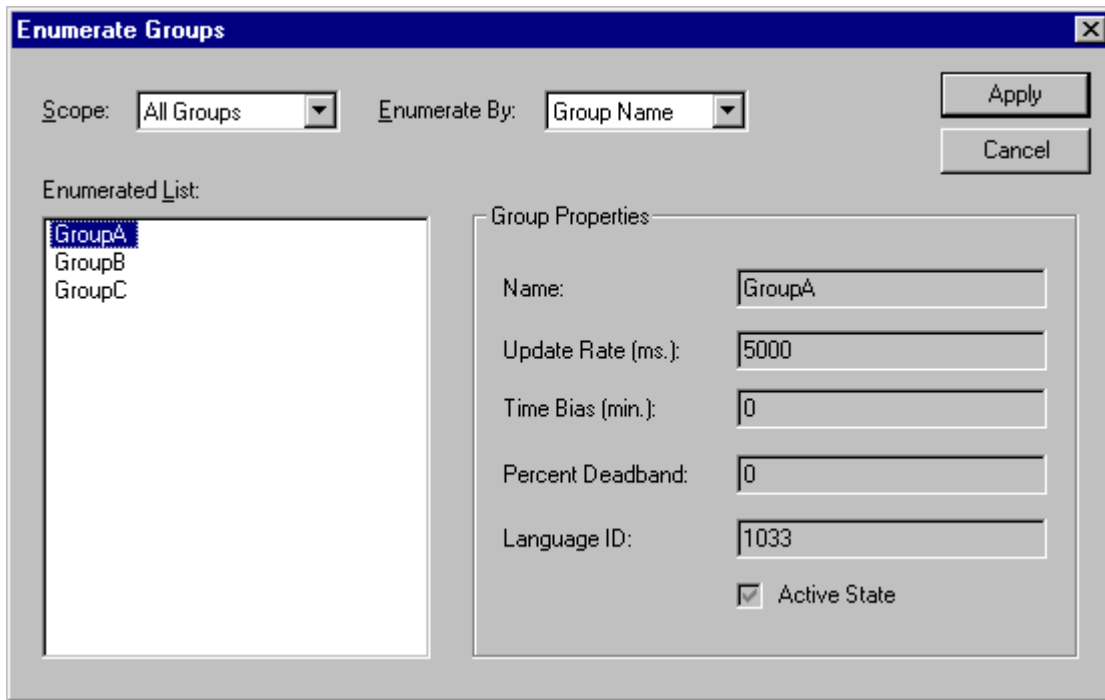


To request an error description from the server, enter the error code and press Apply. If the server can translate the error code, the description will appear. An OPC server should be able to translate any OPC error code, as well as Win32 errors.

This operation tests the following server functionality: `IOPCServer::GetErrorString ()`.

Enumerate Groups

Select **Enumerate Groups...** from the **Tools|Server** menu to enumerate groups available to the server connection.



Groups can be enumerated two different ways. The server can be requested to enumerate groups by name or by object. Enumerating by name, the server passes back an enumeration of strings each containing the name of a group. Enumerating by object, the server passes back an enumeration of group interface pointers (IUnknown), which the client can make use of, by querying for other interfaces. Either way, the client uses both mechanisms to obtain the same results, a list of group names along with the properties of each group. The client can request only private groups (groups this client added to the server connection), public groups (groups that may have been added by another client but made available to us) or all groups be enumerated.

This operation tests the following server functionality: IOPCServer::CreateGroupEnumerator (), IOPCServer::GetGroupByName (), IOPCGroupStateMgt::GetState ().

Get Group By Name

Select **Get Group ByName...** from the **Tools|Server** menu to obtain group properties by name.

To request group properties by name; enter the name of the group and press Apply. If the server can resolve the group name, the client will proceed to obtain the properties for that group.

This operation tests the following server functionality: IOPCServer::GetGroupByName (), IOPCGroupStateMgt::GetState ().

Group Operations

Clone Group

Select **Clone Group** from the **Tools|Group** menu to clone the selected group. An OPC server should create a new group, with a unique name, with identical properties to the group that is being cloned. If the cloned group contains items, the items should also be cloned, again with the same properties. The active state of the cloned group and items should be set to an inactive state.

This operation tests the following server functionality: IOPCGroupStateMgt::CloneGroup, SetState (), IOPCItemMgt::CreateEnumerator, SetClientHandles (), IEnumOPCItemAttributes::Reset, Next ().

Item Operations

Set Active/Inactive

Select **SetActive/Inactive** from the **Tools|Item** menu to activate/inactivate the selected item(s). Only active items should receive on data change updates (the group must also be set active)

Synchronous Read (Cache/Device)

Select **Synchronous CacheRead** or **SynchronousDevice Read** from the **Tools|Item** menu to perform a synchronous read from cache/device, respectively, on the selected items.

Asynchronous Read (Cache/Device)

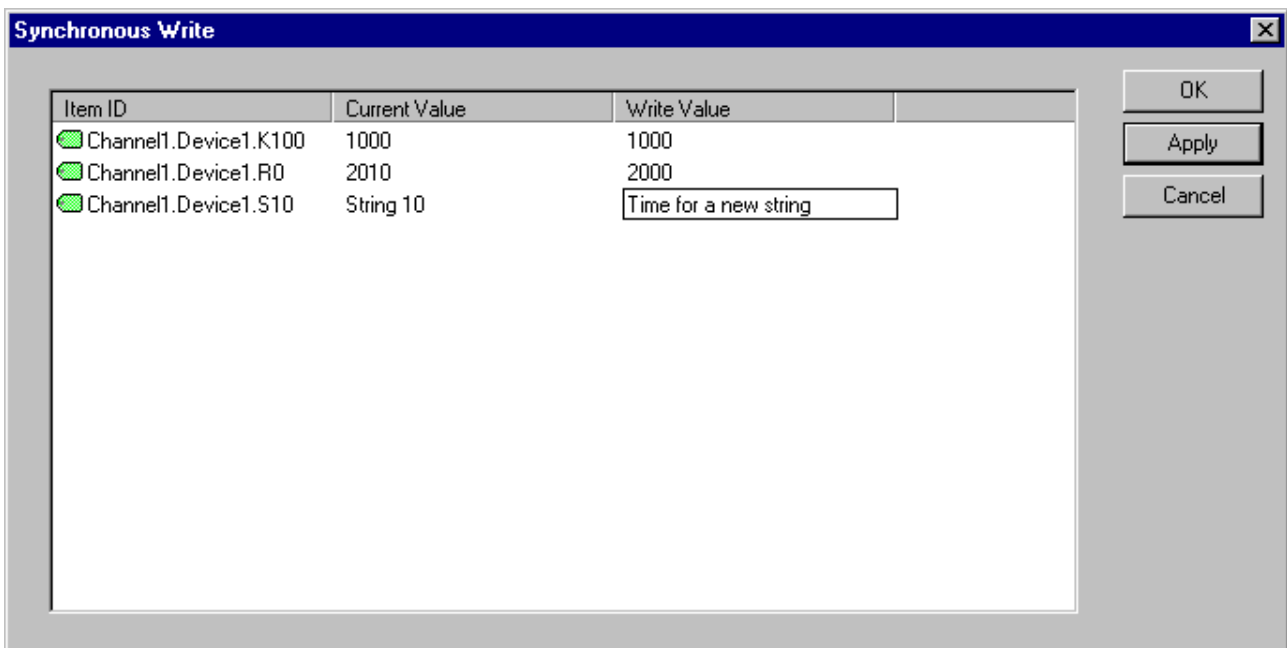
Select **Asynchronous 1.0/2.0 Cache Read** or **Asynchronous 1.0/2.0 Device Read** from the **Tools|Item** menu to perform an asynchronous read from cache/device, respectively, on the selected items. Reads using the older method, 1.0, uses IAdviseSink to return read complete notifications. The newer method, 2.0, uses connection points to exchange data between client and server.

Asynchronous Refresh (Cache/Device)

Select **Asynchronous 1.0/2.0 Cache Refresh** or **Asynchronous 1.0/2.0 Device Refresh** from the **Tools|Item** menu to perform an asynchronous refresh from cache/device on the respective selected items. Refreshes using the older method, 1.0, uses IAdviseSink to return refresh notifications. The newer method, 2.0, uses connection points to exchange data between client and server.

Synchronous/Asynchronous Write

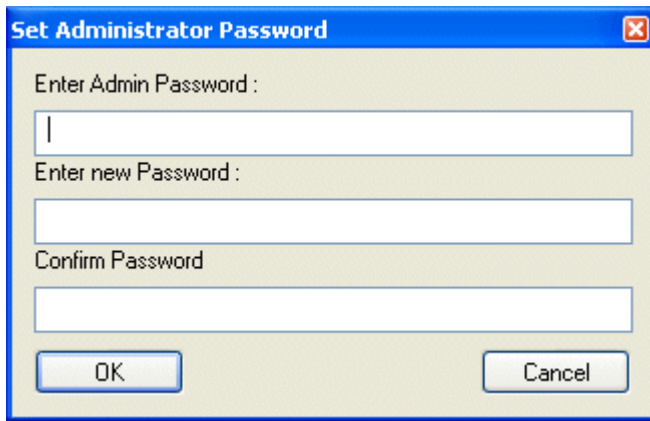
Select **Synchronous Write** or **Asynchronous 1.0/2.0 Write** from the **Tools|Item** menu to perform a synchronous/asynchronous write on the selected items.



Both types of writes utilize the same dialog. The dialog displays the current value at a 100-millisecond refresh rate. Enter the data to write in the write value column and press Apply to send the data to the server. Pressing "OK" applies the write and closes the dialog. Press Cancel to abort the operation.

Security Operations

You may choose to protect administrative operations on a configuration with an admin password. To do so, select tools->SetPwd from the menu. In the Following Dialog you are prompted to enter the current and new Administration passwords.



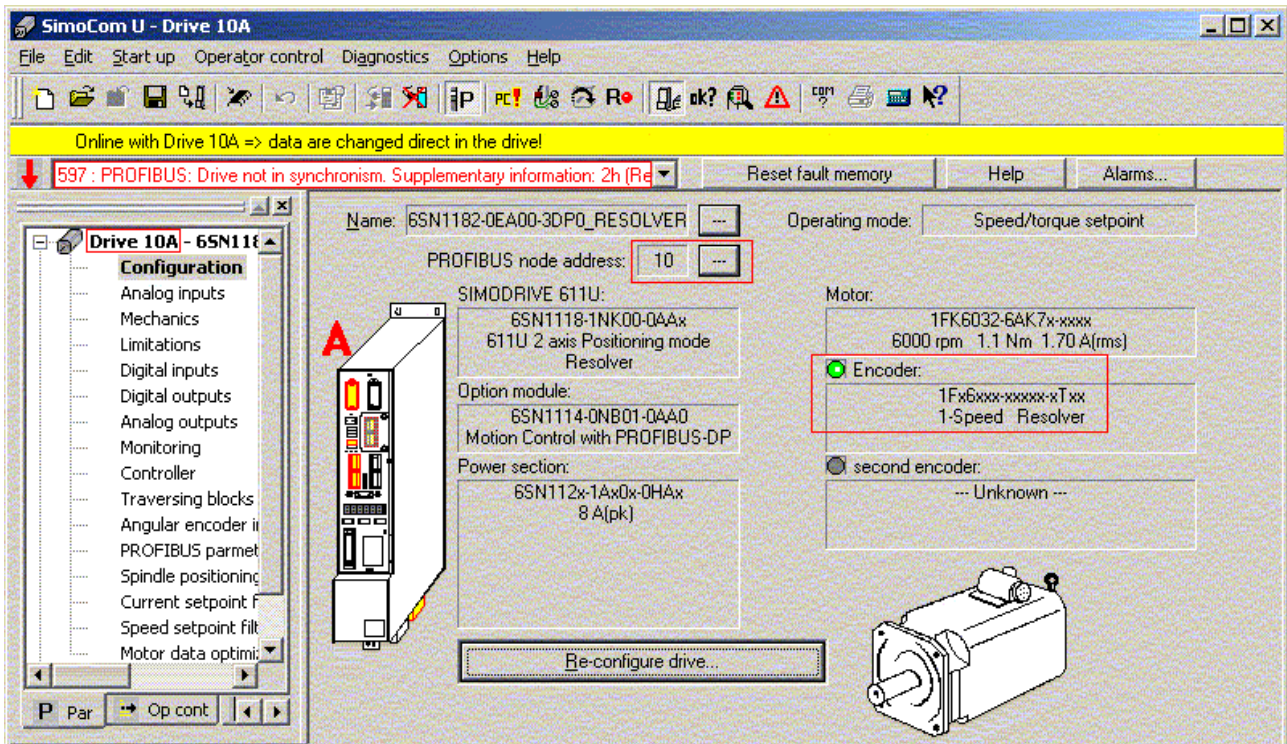
The image shows a dialog box titled "Set Administrator Password" with a blue header and a close button in the top right corner. The dialog contains three text input fields: "Enter Admin Password :", "Enter new Password :", and "Confirm Password". At the bottom, there are two buttons: "OK" and "Cancel".

As soon as you switch to a non-blank password, any administrative operation on the document will be prohibited. To perform administrative tasks select tools->login and enter the password.

8 SimoComU ProfiDrive

8.1 ProfiDrive Configuration

Main Configuration



Profibus Address

The Profibus node address of the 611u ProfiDrive is setup on the Configuration tab. A double ProfiDrive has only one Profibus node address.

Encoder Type

The encoder type is shown on the Configuration tab. In case of an encoder, the number of encoder lines is shown on this screen and setup in P1005. In case of a resolver is P1005 set to 0.

Expert List

The Expert List of SimoComU (Windows-Key + E, Startup | Additional Parameters | Expert List) can be used to determine the parameters P880 (Speed Evaluation) and P1005 (IM Encoder Pulse Number). Those two parameters have to be entered in the NC ProfiDrive Configuration (see [TwinCAT NC Configuration](#) | 14|).

Online with Drive 10B => data are changed direct in the drive!

PROFIBUS OFF1 Control of the clock cycle-synchronous PROFIBUS

Number	Text	Value	Unit	Active
880	Speed evaluation, PROFIBUS	16384	rpm	immed.
881	Evaluation torque/power reduction PROFIBU	16384.00	%	immed.
882	Evaluation, torque setpoint PROFIBUS	800.00	%	immed.
888:0	Function, distributed input (PROFIBUS)	0		immed.
890	Activate angular encoder/encoder interface	0		Power On
891	Source, external position reference value	-1		Power On
892	No. of angular encoder marks / no. of encod	0		Power On
893	Angular encoder zero pulse offset	0.00	Degree	Power On
894	Angular encoder input signal waveform	0		Power On
915:0	PZD setpoint value assignment PROFIBUS	0		immed.
916:0	PZD actual value assignment PROFIBUS	0		immed.
918	PROFIBUS node address	10		Power On
922	PROFIBUS frame selection	3		Power On
923:0	List of PROFIBUS standard signals	0		Read only
945:0	Fault code	0		Read only
947:0	Fault number	0		Read only
948:0	Fault time	0	ms	Read only
949:0	Fault value	0		Read only
952	Number of faults	0		Read only
953	Warnings 800-815	0000h	Bits->F4	Read only

Online with Drive 10B => data are changed direct in the drive!

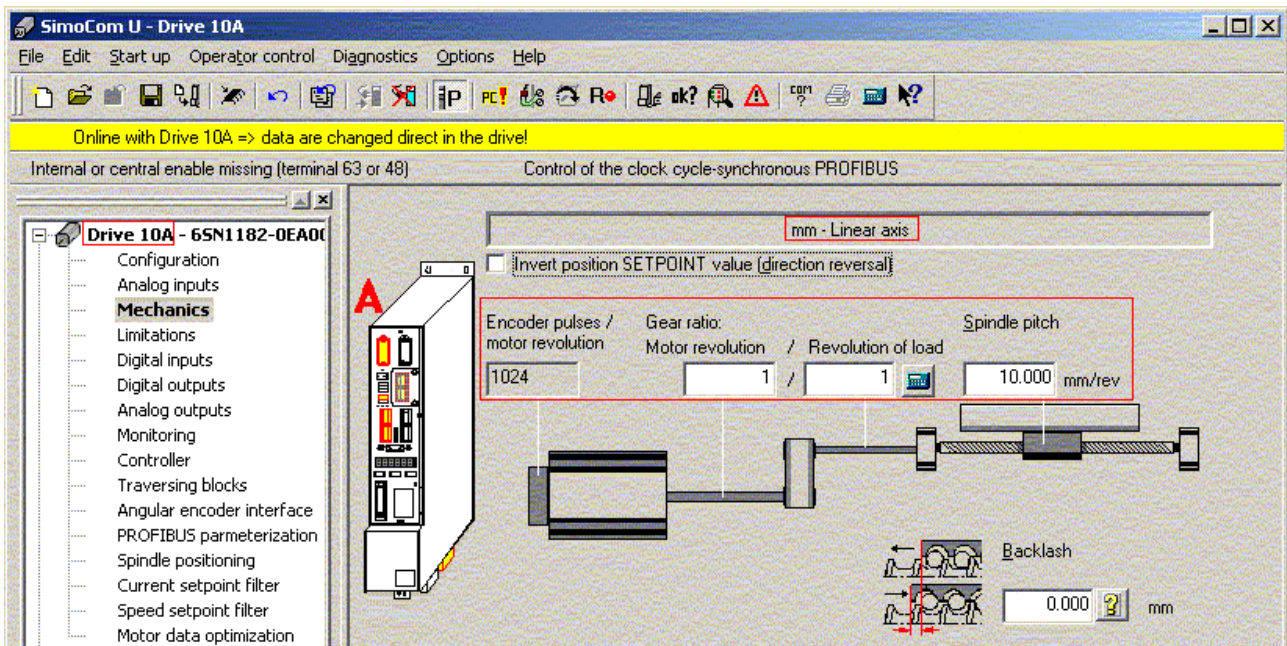
PROFIBUS OFF1 Control of the clock cycle-synchronous PROFIBUS

Number	Text	Value	Unit	Active
954	Warnings 816-831	0000h	Bits->F4	Read only
955	Warnings 832-847	0000h	Bits->F4	Read only
956	Warnings 848-863	0000h	Bits->F4	Read only
957	Warnings 864-879	0000h	Bits->F4	Read only
958	Warnings 880-895	0000h	Bits->F4	Read only
959	Warnings 896-911	0000h	Bits->F4	Read only
960	Warnings 912-927	0000h	Bits->F4	Read only
963	Baud rate PROFIBUS	9		Read only
967	PROFIBUS control word	047Eh	Bits->F4	Read only
968	PROFIBUS status word	0331h	Bits->F4	Read only
969	Current time difference	661840	ms	Read only
972	Request POWER-ON RESET	0		immed.
1000	Current controller cycle	4	31.25µs	Power On
1001	Speed controller cycle	16	31.25µs	Power On
1004	Structure configuration	0000h	Bits->F4	Power On
1005	IM encoder pulse number	0		Power On
1006	IM encoder code number	20		Power On
1007	DM encoder pulse number	0		Power On
1008	IM encoder phase error correction	0.00	Degree	immed.
1009	Position controller cycle	32	31.25µs	Power On

Gearbox and Spindle Pitch

The gearbox between motor and load can be setup on the Mechanics screen. The spindle pitch is only available for linear axes.

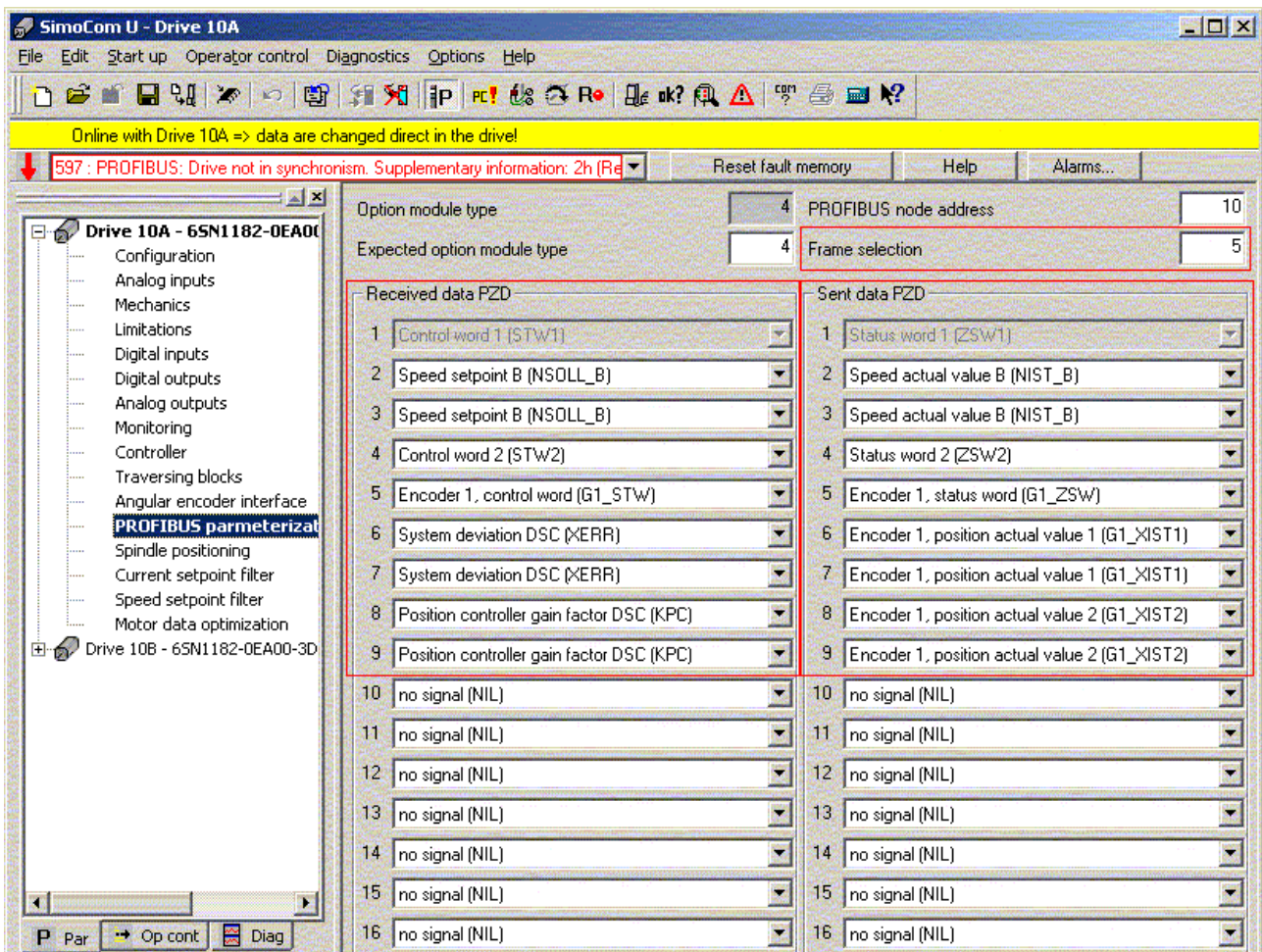
The Gearbox and the spindle pitch must be setup only in one place, either in the drive Mechanics screen or through the NC Encoder Scaling Factor (see [TwinCAT NC Configuration \[► 14\]](#)).



Profibus Telegram Selection

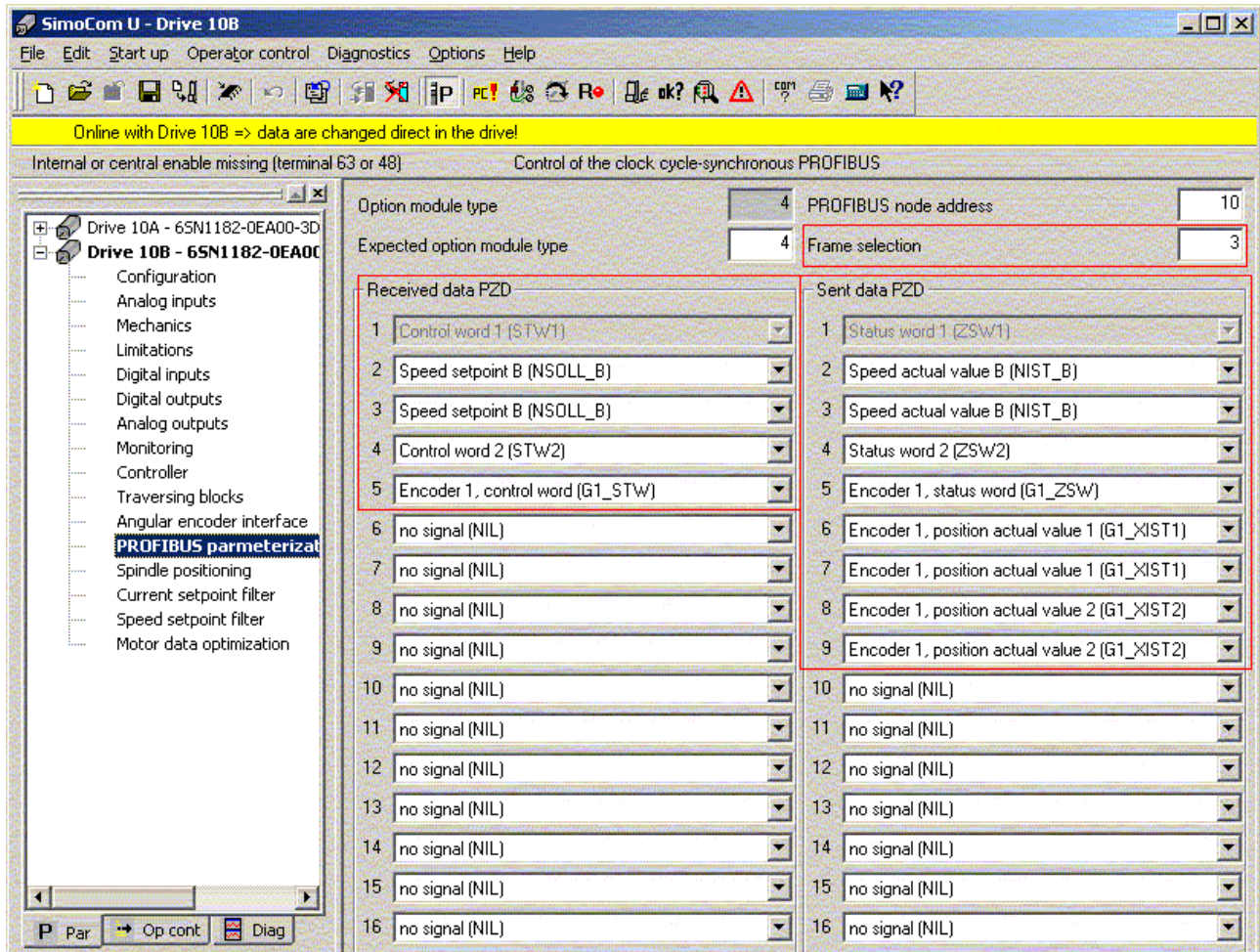
Telegram 5 (DSC)

With telegram type 5 the drive closes the position loop using the NC following error (lag) and a position gain KPC in the cyclic interface. The NC runs open loop in this case.



Telegram 3

With telegram type 3 the drive closes the velocity loop using. The NC closes the position loop in this case.

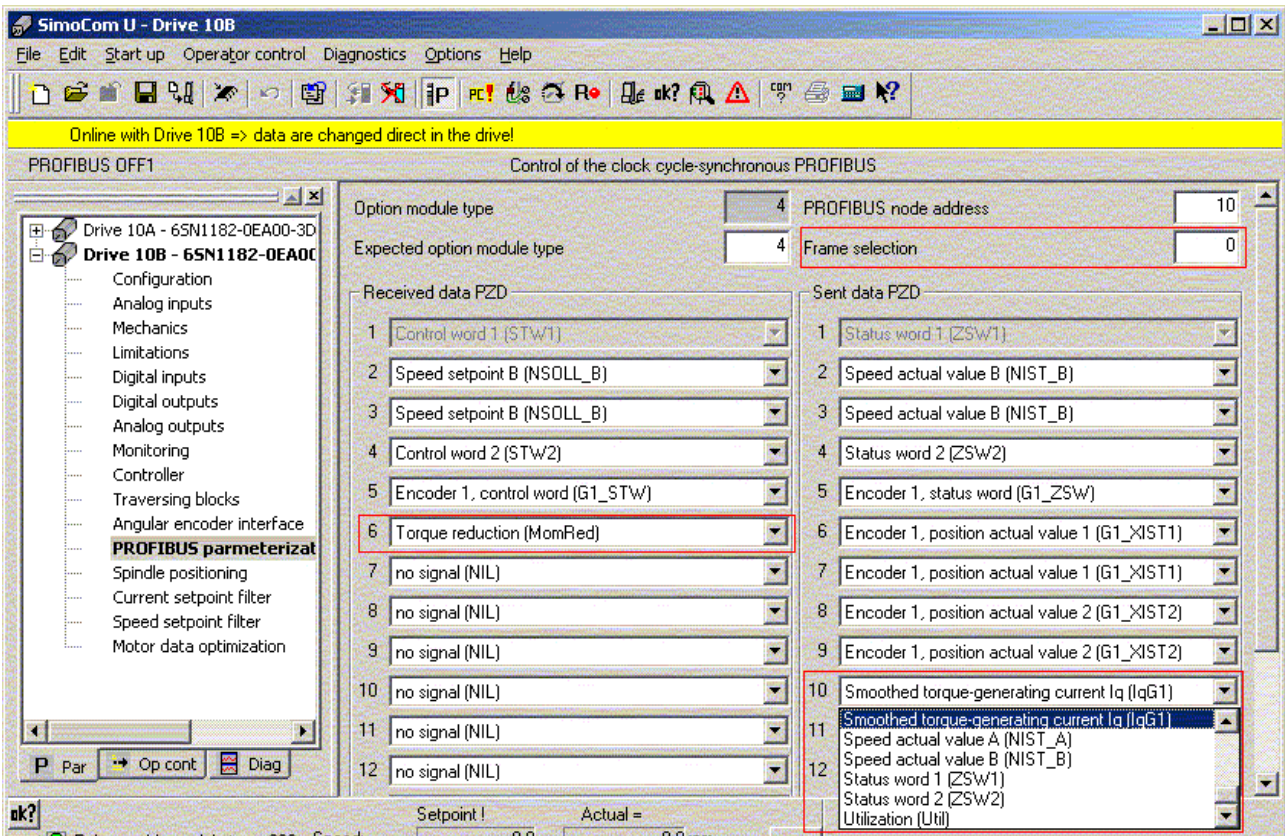


Telegram Type 0

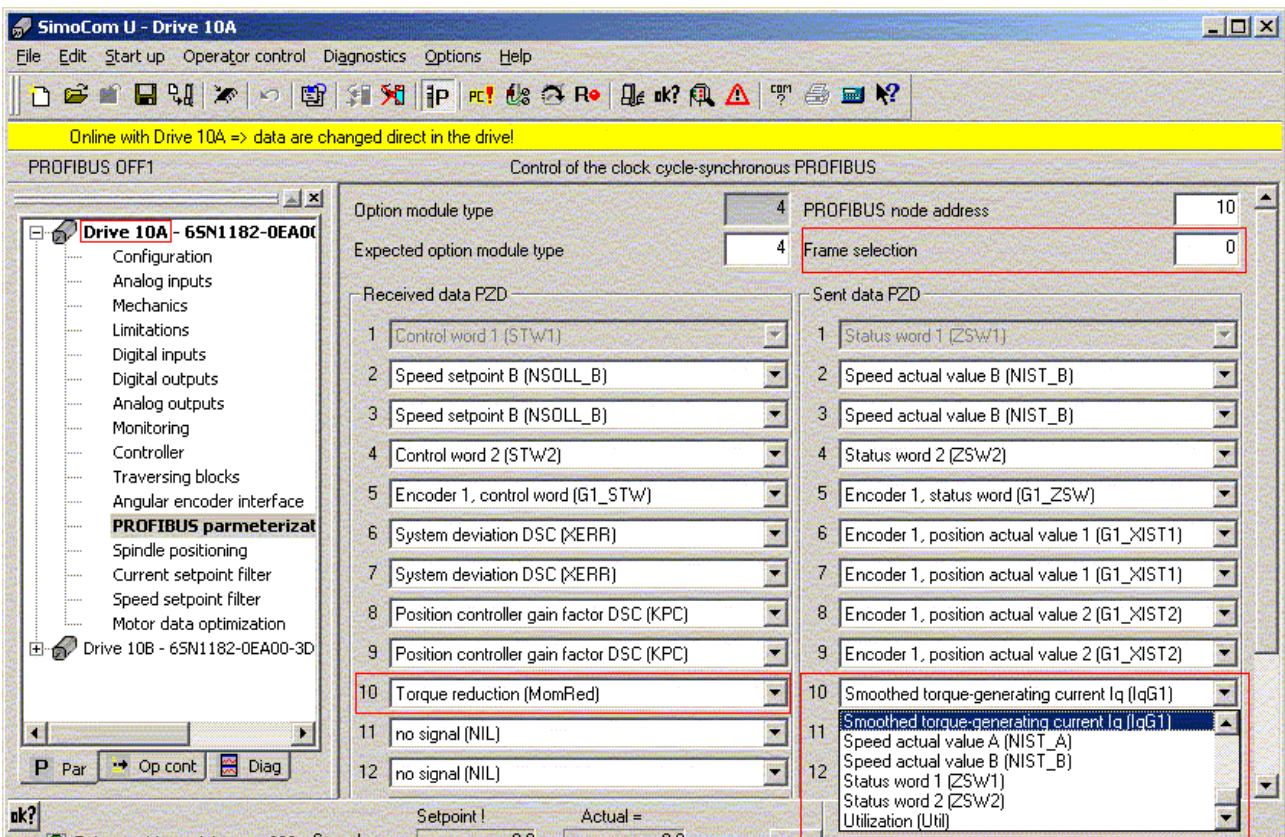
Telegram type 0 can be used to add parameters to telegram type 3 or 5. The telegram type can be changed with the Frame Selection on the Profibus Parameterization tab. The previous content of the cyclic profibus interface remains the same. After changing the telegram type, the EEPROM must be saved and the drive to be reset.

Now the new data can be added to the nominal values (Received Data) or to the actual values (Sent Data).

Telegram 3 to 0

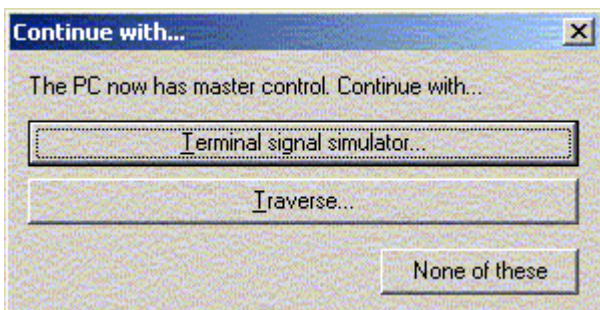
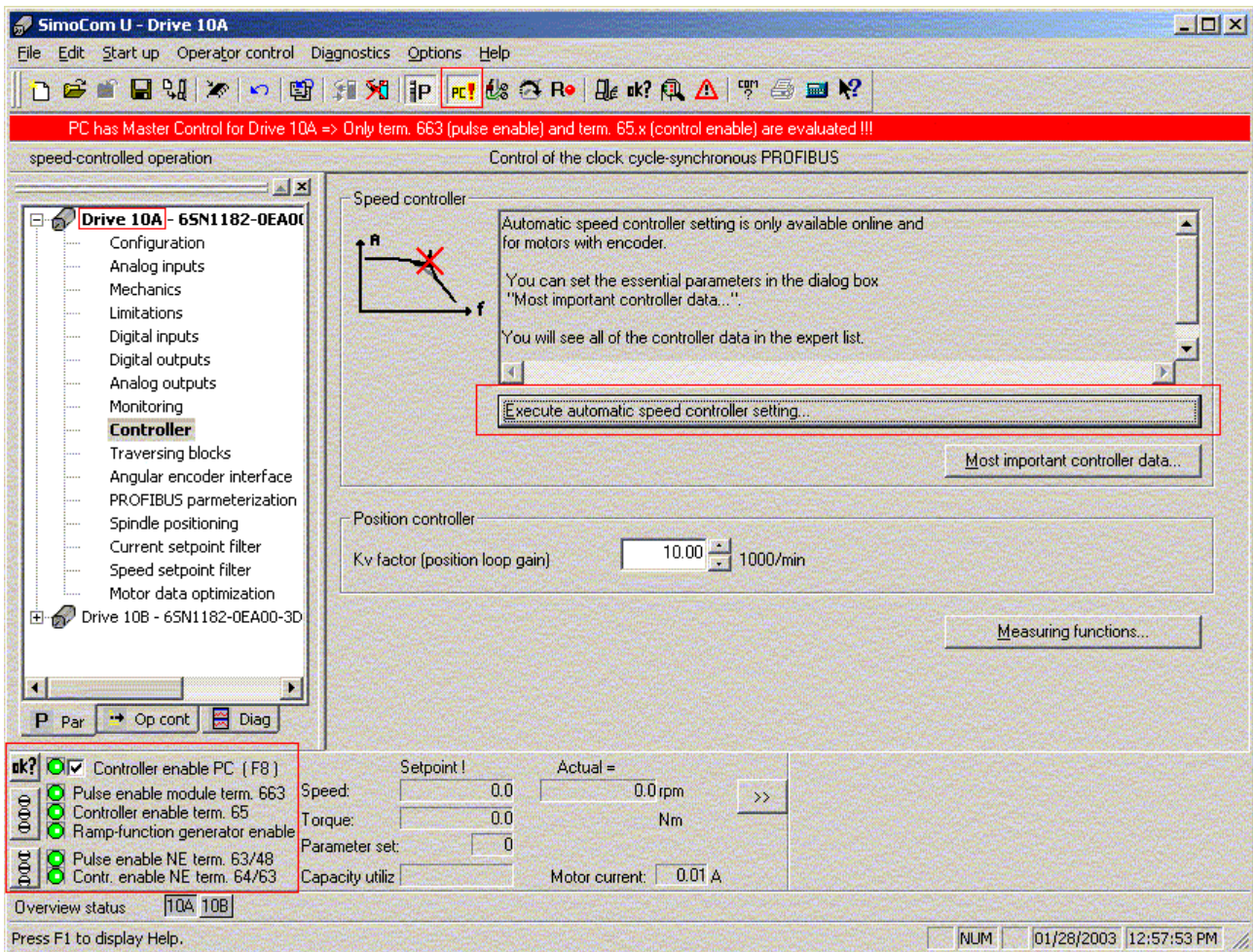


Telegram 5 to 0

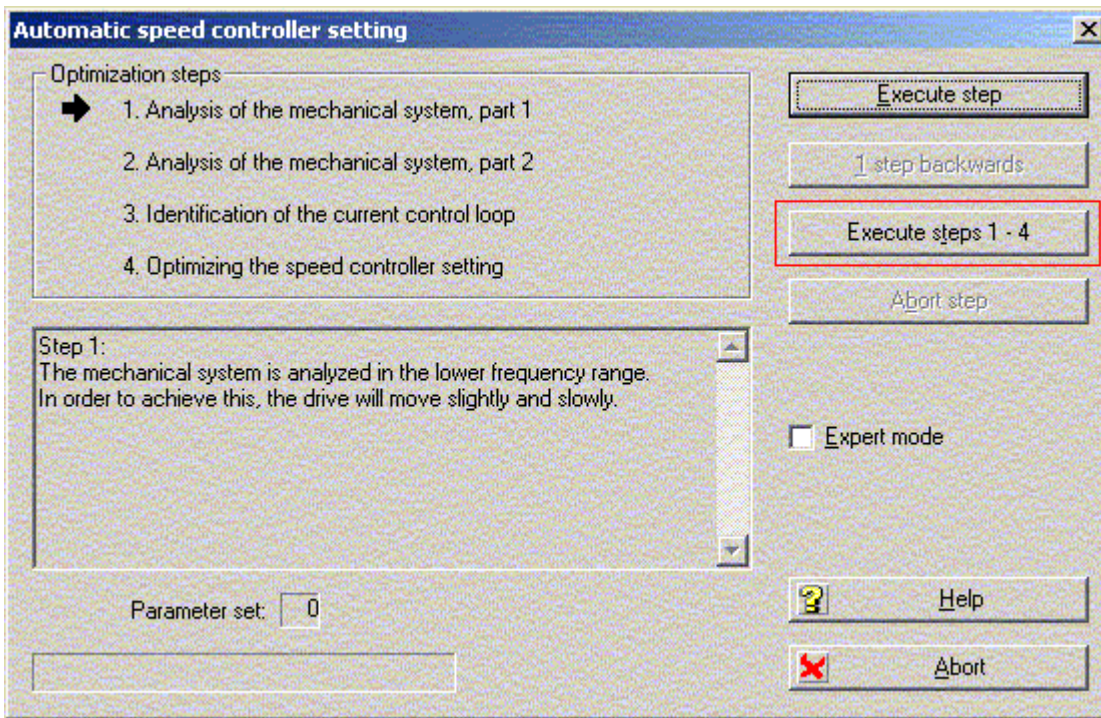


Auto Tuning

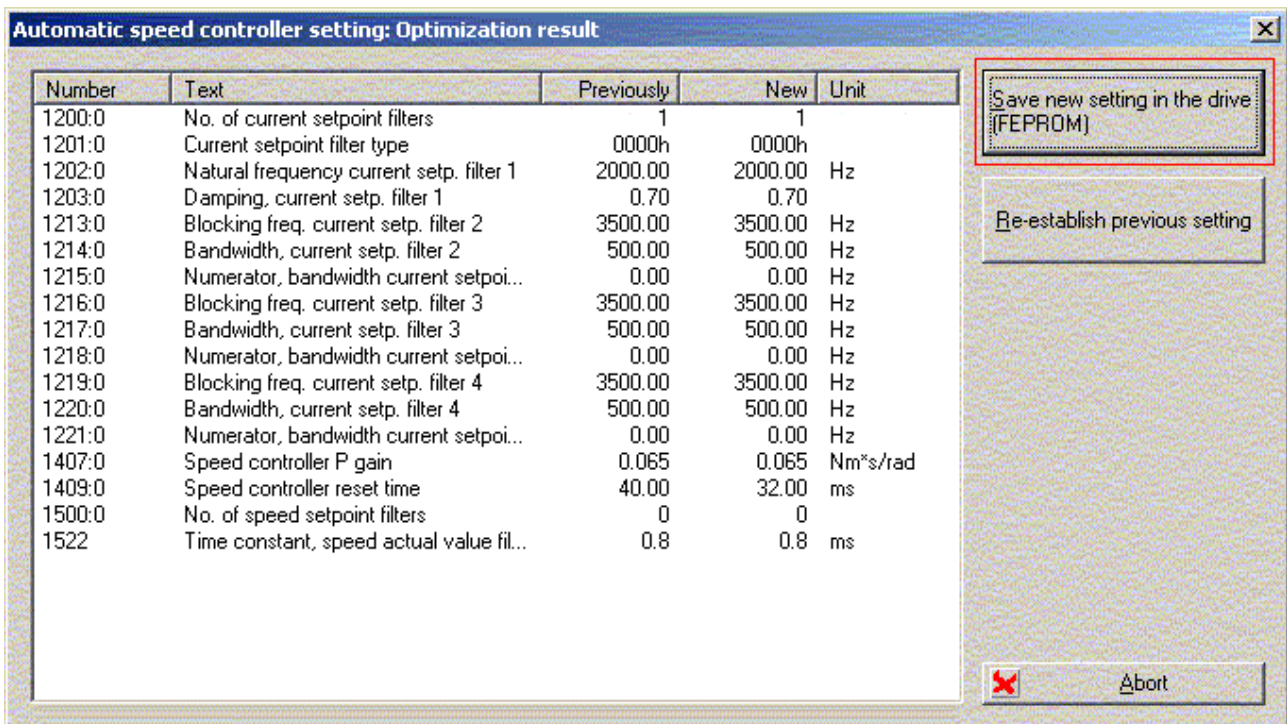
The ProfiDrive supports an auto tuning mechanism. For this purpose, the control has to be switched to [PC!], which means the drive ignores the cyclic Profibus interface and uses a terminal signal simulation.



The auto tuning is wizard guided.



At the end of the tuning the tuning parameters have to be saved to the EEPROM.



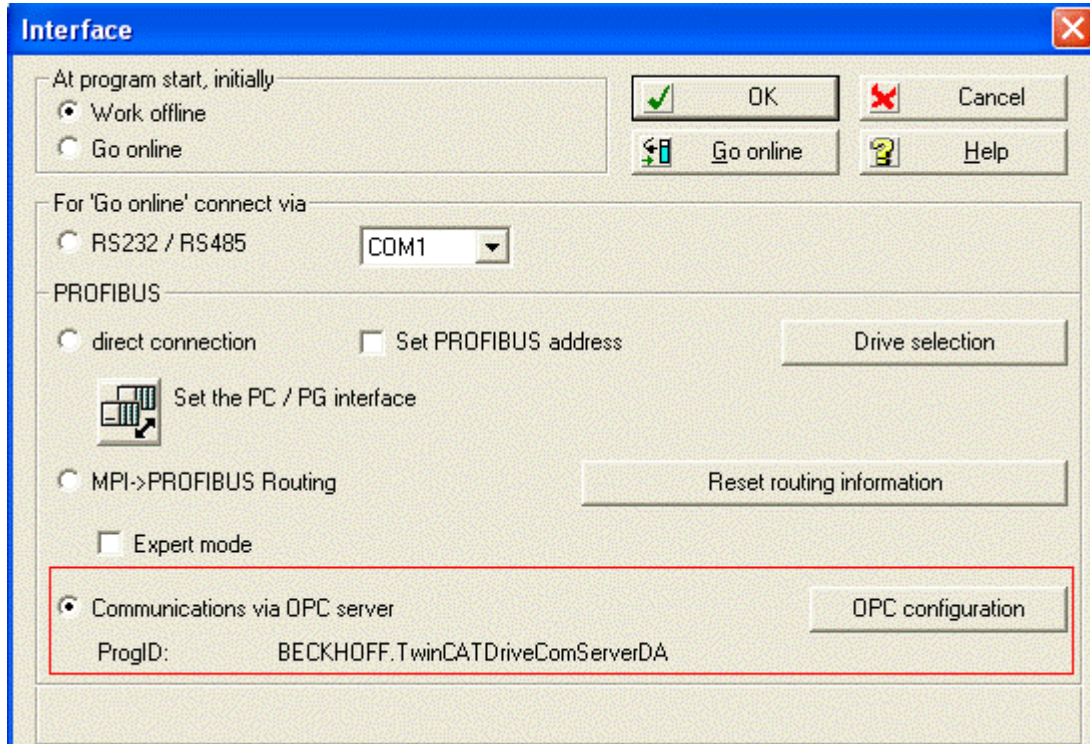
8.2 OPC Configuration

For requirements see [Installation Sequence \[► 8\]](#).

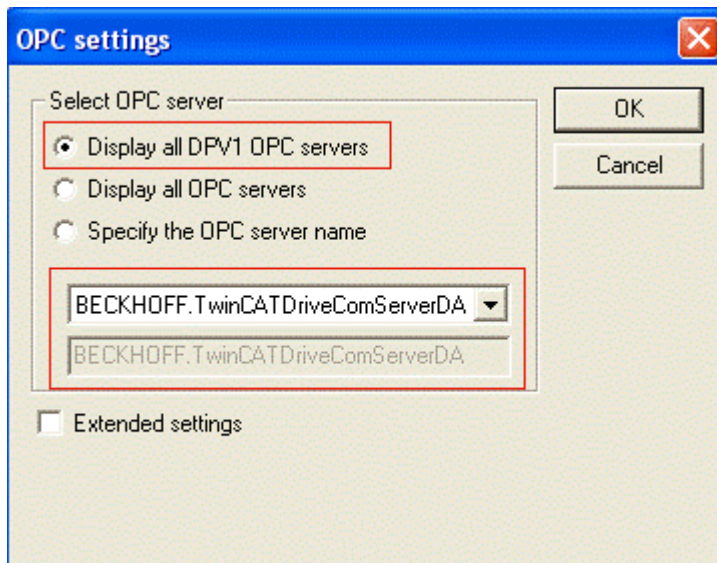
After the SimoComU installation the following changes have to be made:

1. Start TwinCAT with the valid Profibus configuration
2. Start SimoComU

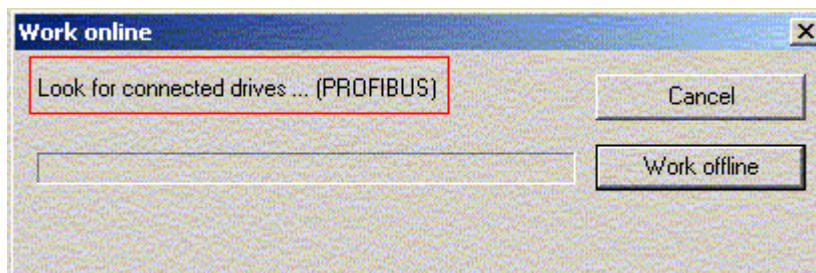
3. Configure the OPC server communication in SimoComU (Options|Setting|Communication)



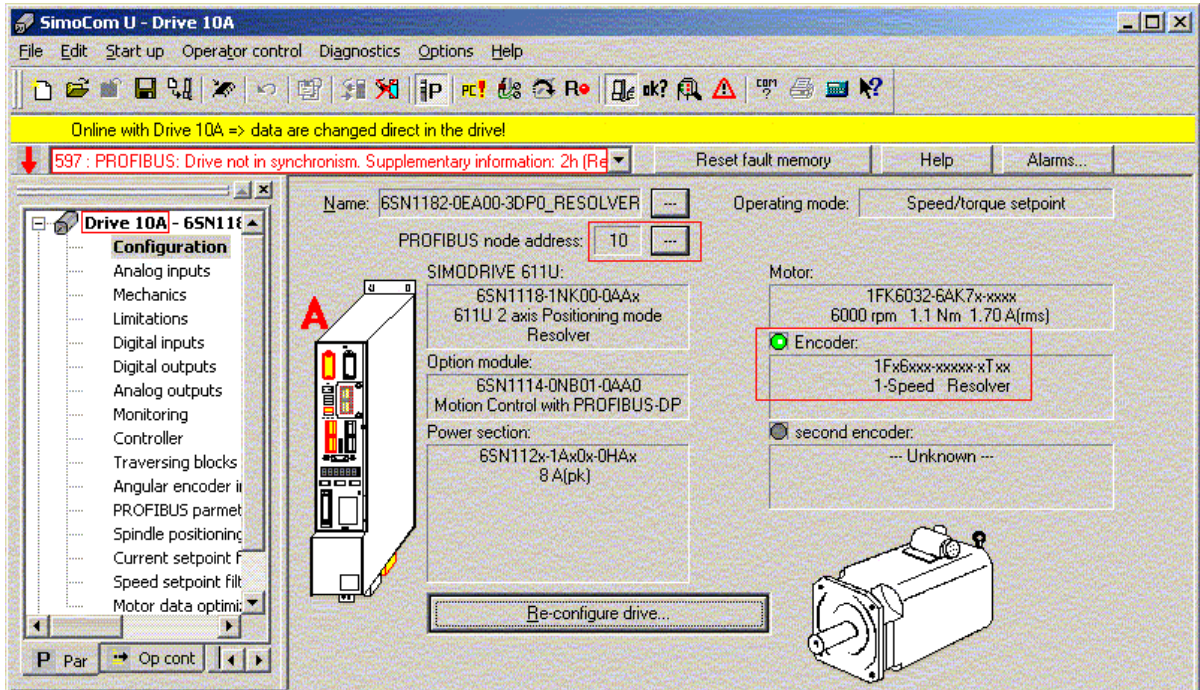
4. Select "BECKHOFF.TwinCATDriveComServerDA"



5. Search online for ProfiDrives in SimoComU



6. Configure the ProfiDrive in SimoComU via OPC



8.3 ProfiDrive Diagnostic

Profibus Diagnostic

The Profibus diagnostics dialog shows online the incoming and outgoing telegrams incl. their data.

Telegram 3.

SimoCom U - Drive 10B

File Edit Start up Operator control Diagnostics Options Help

Online with Drive 10B => data are changed direct in the drive!

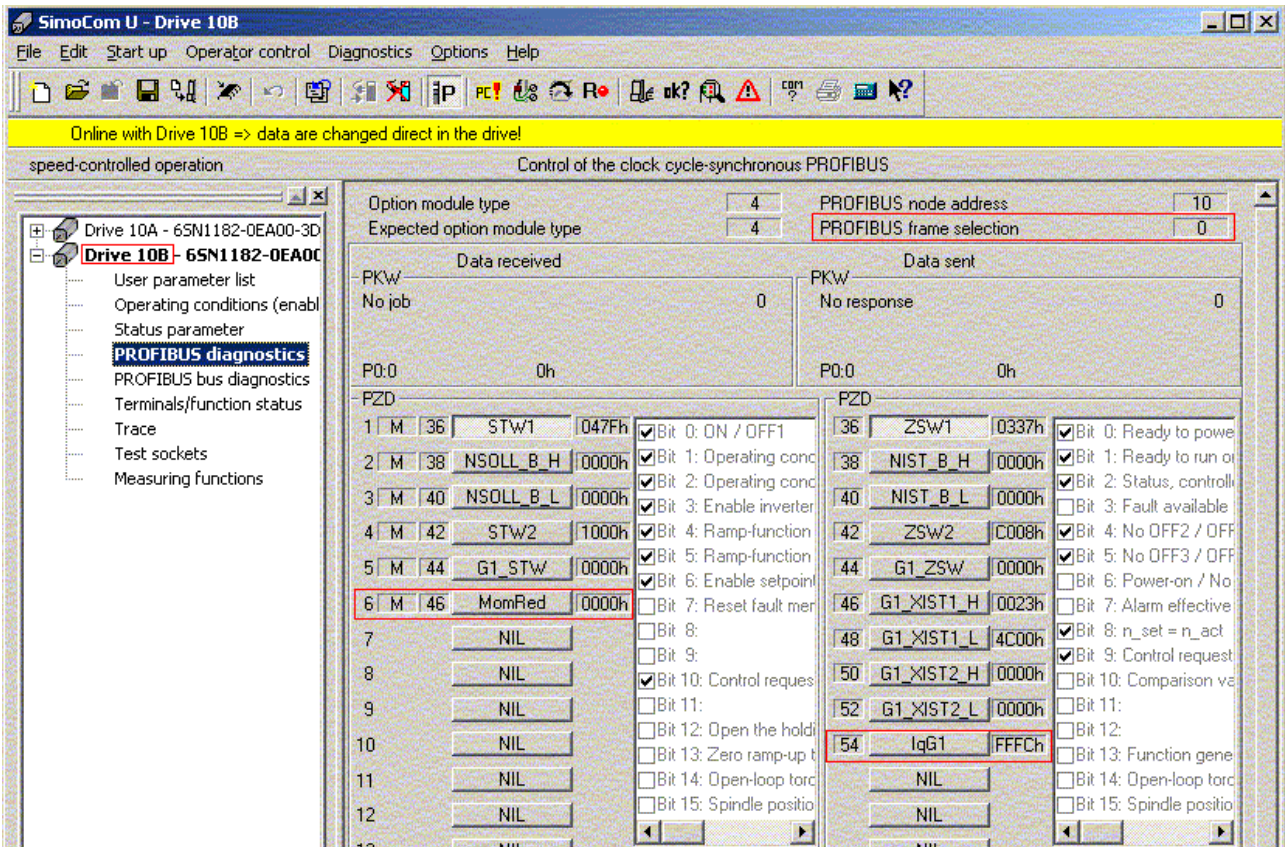
PROFIBUS OFF1 Control of the clock cycle-synchronous PROFIBUS

Option module type 4 PROFIBUS node address 10
 Expected option module type 4 PROFIBUS frame selection 3

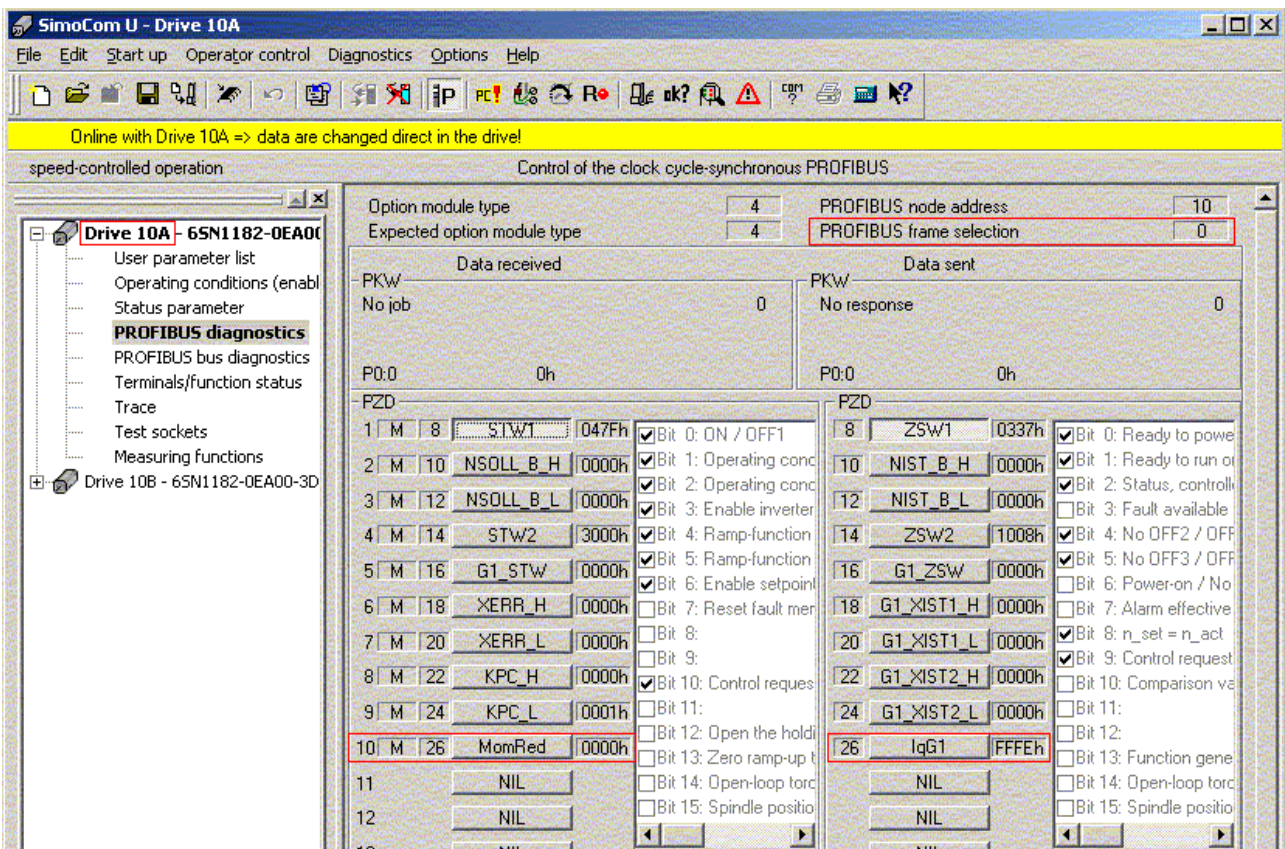
Data received				Data sent			
PKW				PKW			
No job			0	No response			0
P0:0		0h		P0:0		0h	
PZD				PZD			
1	M	34	STW1 047Eh	34	ZSW1	0331h	<input checked="" type="checkbox"/> Bit 0: ON / OFF1
2	M	36	NSOLL_B_H 0000h	36	NIST_B_H	0000h	<input checked="" type="checkbox"/> Bit 1: Operating cond
3	M	38	NSOLL_B_L 0000h	38	NIST_B_L	0000h	<input checked="" type="checkbox"/> Bit 2: Operating conc
4	M	40	STW2 6000h	40	ZSW2	3018h	<input checked="" type="checkbox"/> Bit 3: Enable inverter
5	M	42	G1_STW 0000h	42	G1_ZSW	0000h	<input checked="" type="checkbox"/> Bit 4: Ramp-function
6			NIL	44	G1_XIST1_H	0048h	<input checked="" type="checkbox"/> Bit 5: Ramp-function
7			NIL	46	G1_XIST1_L	B400h	<input checked="" type="checkbox"/> Bit 6: Enable setpoint
8			NIL	48	G1_XIST2_H	0000h	<input type="checkbox"/> Bit 7: Reset fault mer
9			NIL	50	G1_XIST2_L	0000h	<input type="checkbox"/> Bit 8: n_set = n_act
10			NIL				<input checked="" type="checkbox"/> Bit 9: Control request
11			NIL				<input type="checkbox"/> Bit 10: Comparison ve
12			NIL				<input type="checkbox"/> Bit 11:
13			NIL				<input type="checkbox"/> Bit 12: Open the holdi
14			NIL				<input type="checkbox"/> Bit 13: Zero ramp-up t
15			NIL				<input type="checkbox"/> Bit 14: Open-loop torc
16			NIL				<input type="checkbox"/> Bit 15: Spindle positio

P Par Op cont Diag

Telegram 0 (extended telegram 3)

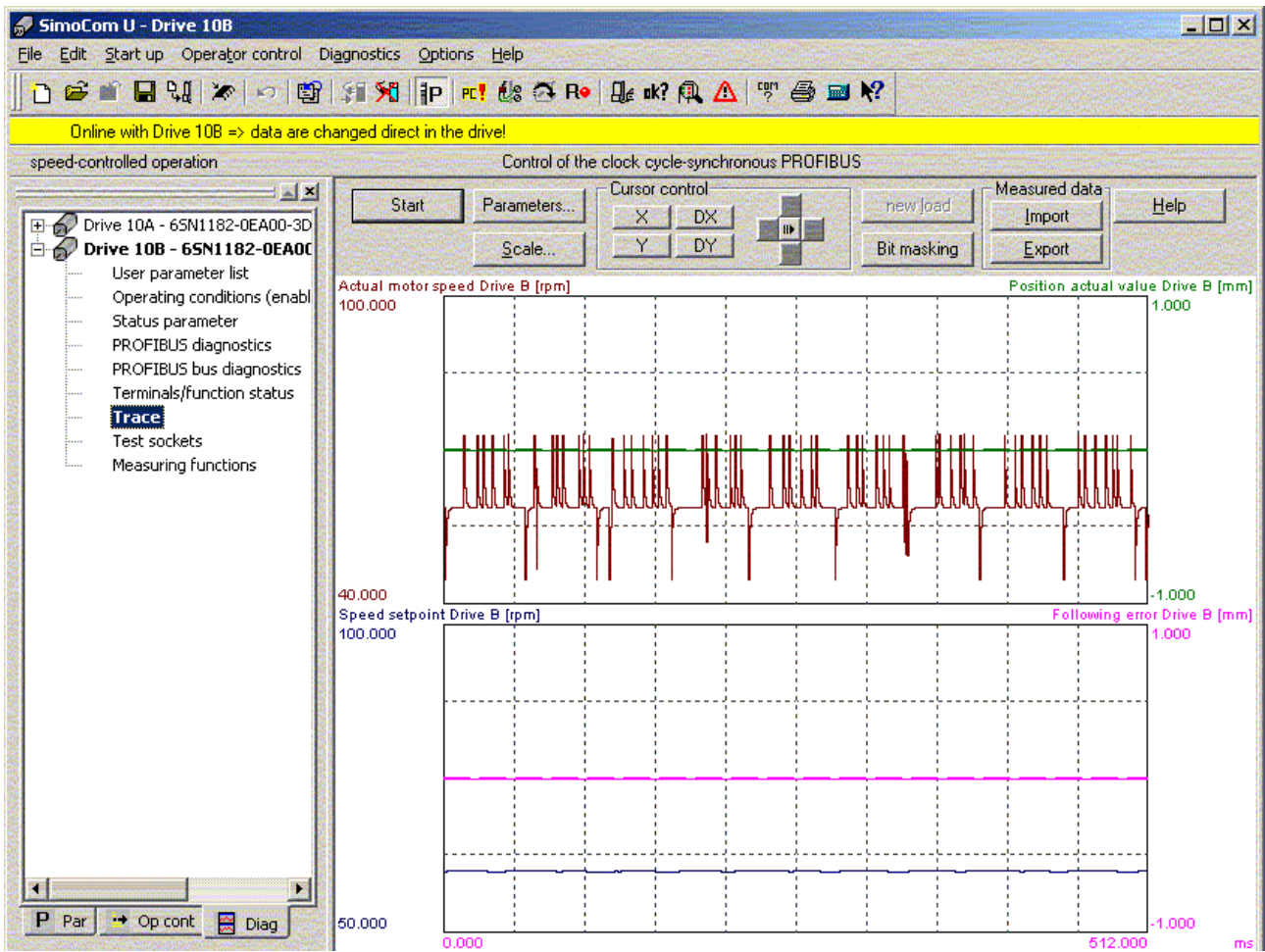


Telegram 0 (extended telegram 5)



Trace

The SimoComU Trace allows to scope internal data of the drive.



9 SimoComU via DriveCOM and CX1500-M310

9.1 Remote Setup of PC

The CX1000 has to be added to the list of remote devices of the programming PC. This is also a requirement for the remote access of the System Manager or the Plc Control. The CX1000 might already be in the list of remote devices. If not then the TwinCAT System Manager can be used to add the CX1000 as a remote device to the PC.

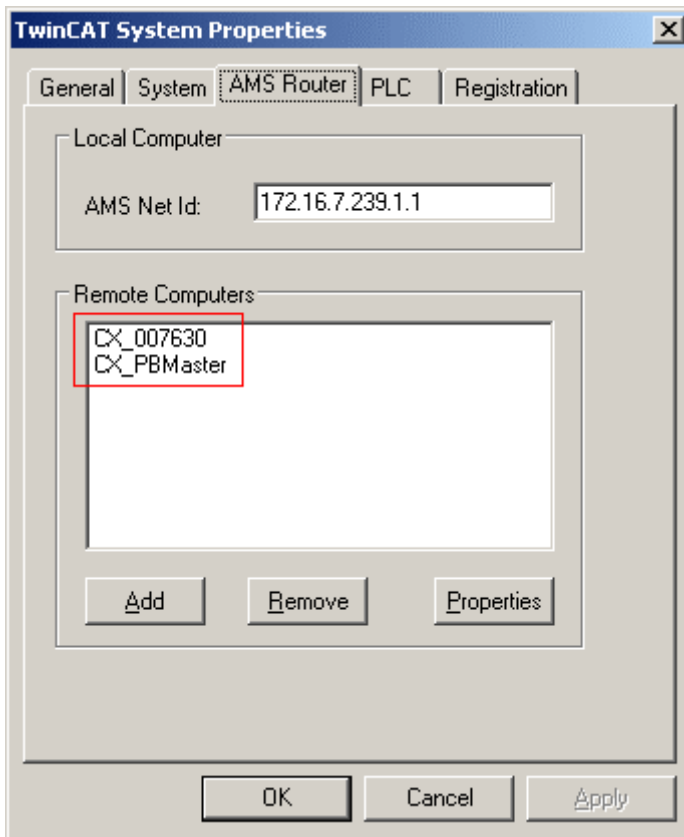
- Use the button "Choose Target" in the System Configuration of the System Manager.
- Press "Search".
- Browse via "Broadcast Search" on the Ethernet network, if it is not found, browse once more.
- Select the particular CX1000 (like CX_007630)
- Add the new route (with WinCE no password is required, with XP an Administrator account with a password is required (e.g. 1)).

If the CX1000 is not found, then the TwinCAT System on the PC and the TwinCAT System on the CX1000 might not be in Config Mode.

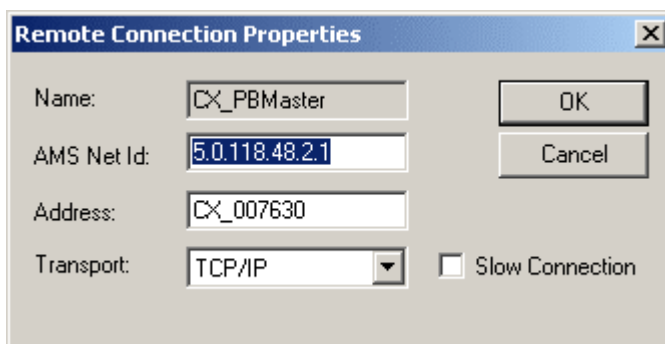
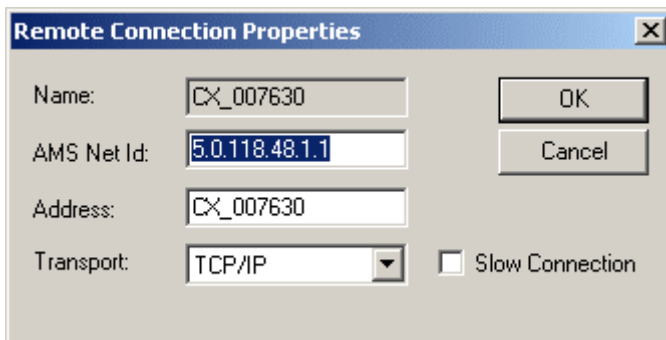
The CX1500-M310 Profibus master has also to be added to the list of remote devices of the programming PC. This can only be done via the TwinCAT Properties page of the TwinCAT icon in the Windows status bar.

- Open the TwinCAT Properties page.
- Select the AMS Router tab.
- Press the Add button in the Remote Computers group box.
- Type a new name for the connection (like CX_PBMaster).
- Add the NetID of the CX1500-M310 Profibus Master (see System Manager file of the CX1000).
- Add the address of the CX1000 (like CX_007630 or the TCP/IP address).
- Select the transportation type TCP/IP.
- Close the dialog with OK
- Restart the TwinCAT System on the PC in Config Mode. The restart in Config Mode is required.

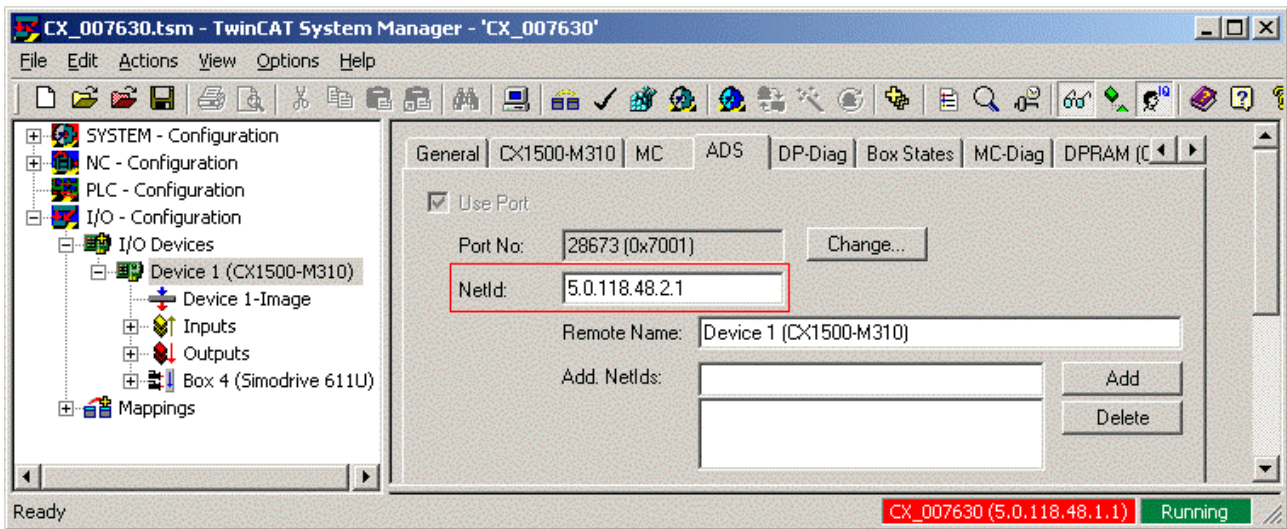
After all the Remote setup should look like this.



The details are shown below.

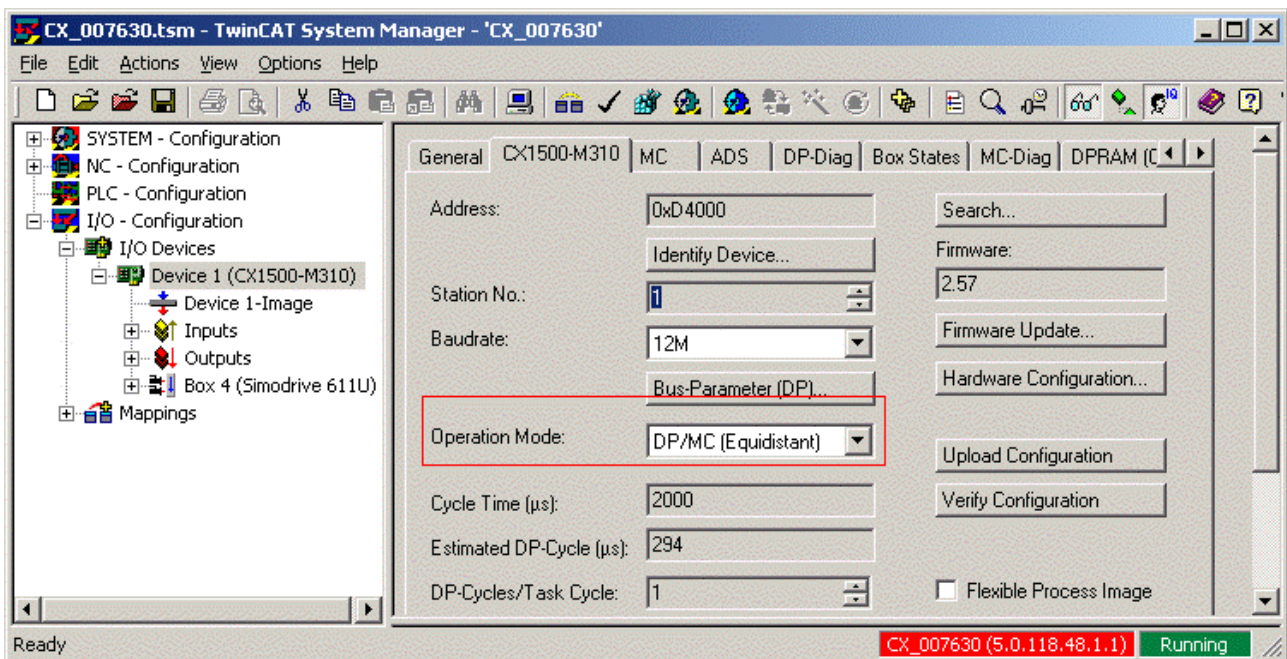


The NetID and the name of the CX1000 is automatically generated and maybe different from the picture. The NetID of CX1500-M310 Profibus Master is configured in the System Manager file of the CX1000. The fifth byte of the NetID of the Profibus Master differs from the NetID of the CX1000 and depends on the number of devices on the CX1000.

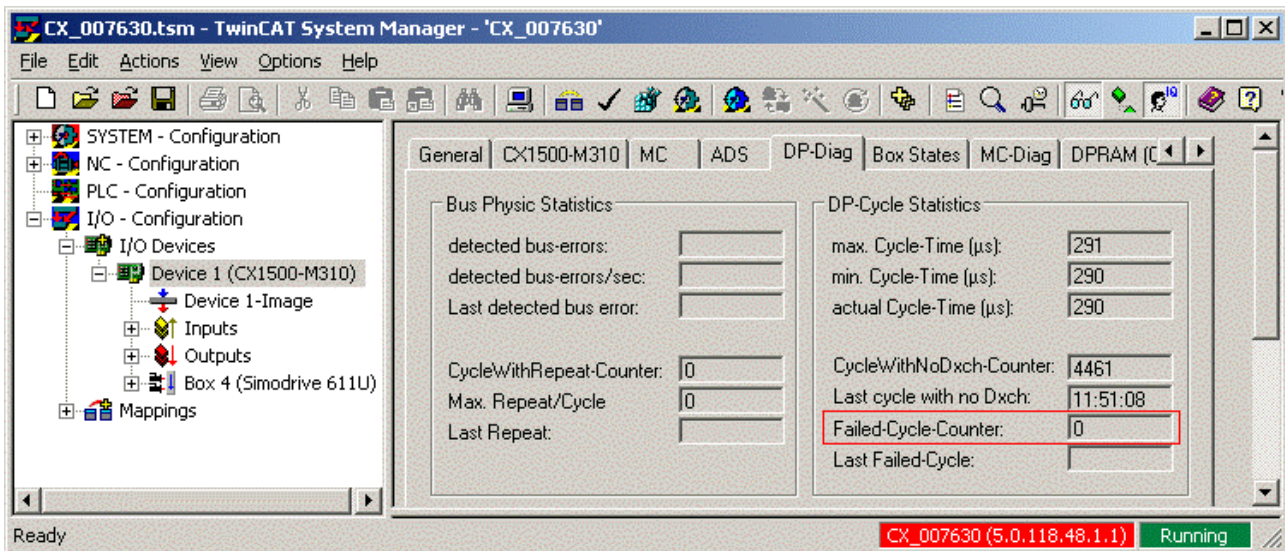


9.2 TwinCAT Configuration for CX1000

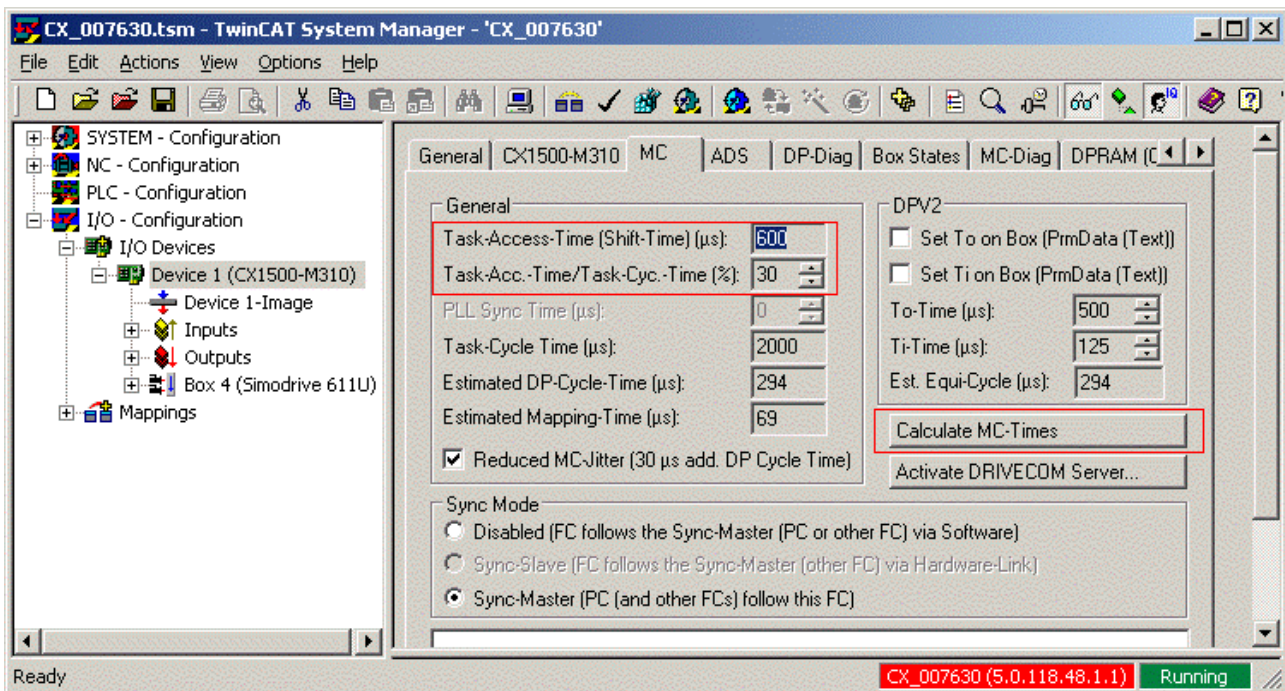
The CX1000 is configured remotely on the PC. The easiest way to configure the I/O is to scan devices and scan boxes in Config Mode. After scanning the Profibus Master the Operating Mode of the Profibus has to be changed to DP/MC Equidistant. To use Profidrives on a CX1000 it is required to have firmware v2.57 or higher on the profibus master.



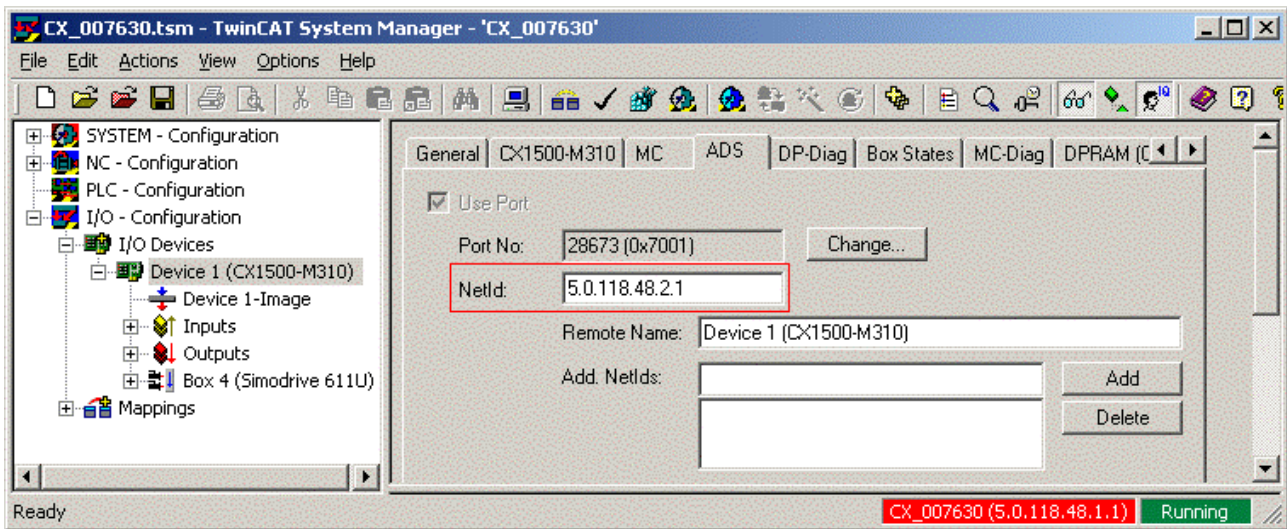
If the 611u drives report the error "life counter set to zero" once they have been enabled, then it might be because of failed profibus cycles.



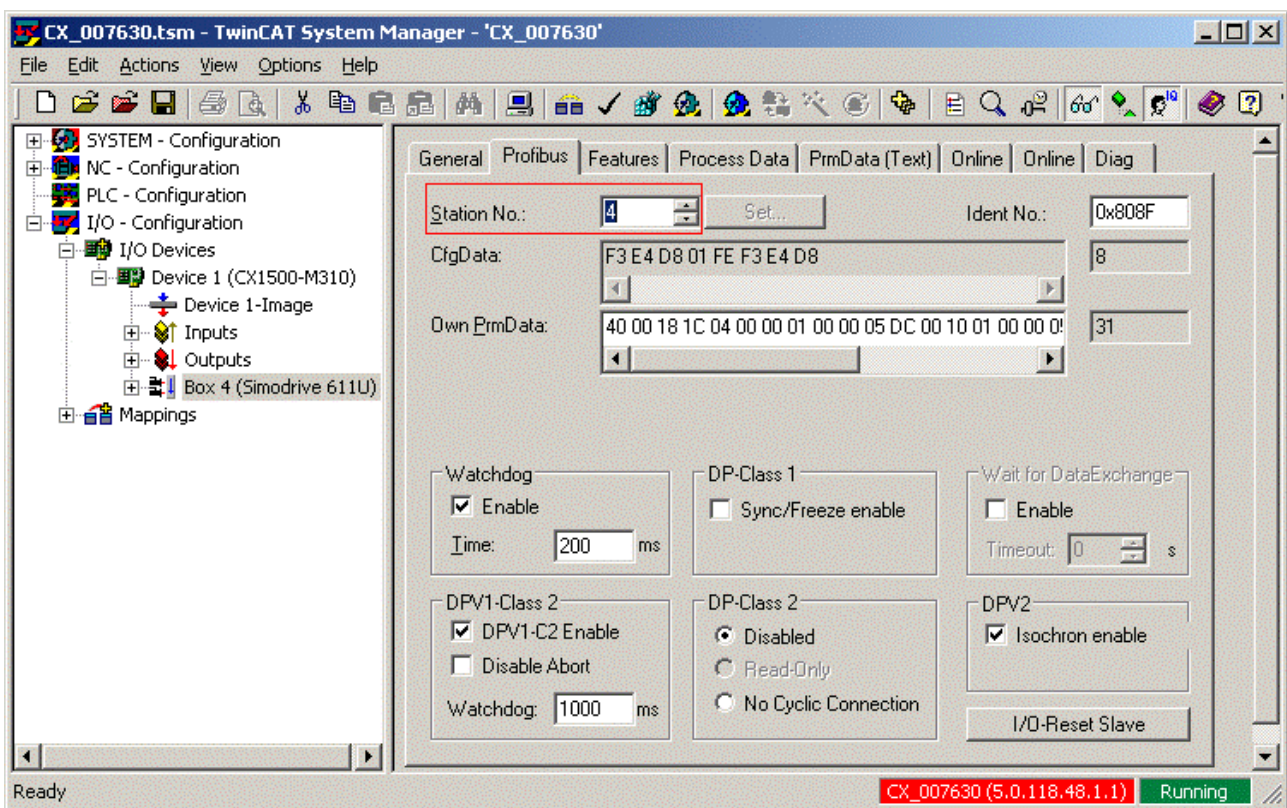
One cause is if the NC access time for the Profibus card is too low. The standard setup is 15% (= 300µs at 2ms Cycle Time), this is too low for the CX-Profibus Master. The Task Access Time/Task Cycle Time should be increased. The reason for this is the TwinCAT jitter on the CX1000. Additionally, the Reduced MC-Jitter flag needs to be activated and the Sync-Master for the CX1500-M1500 has to be selected. After setting up and checking the MC configuration it is required to Calculate the MC-Times.



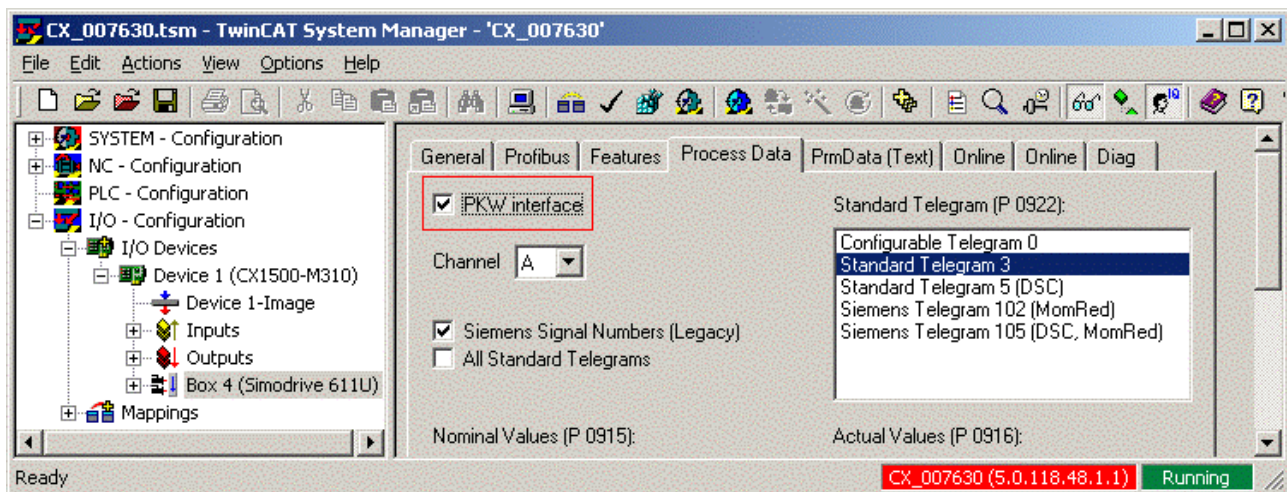
The ADS NetID is set automatically by TwinCAT.



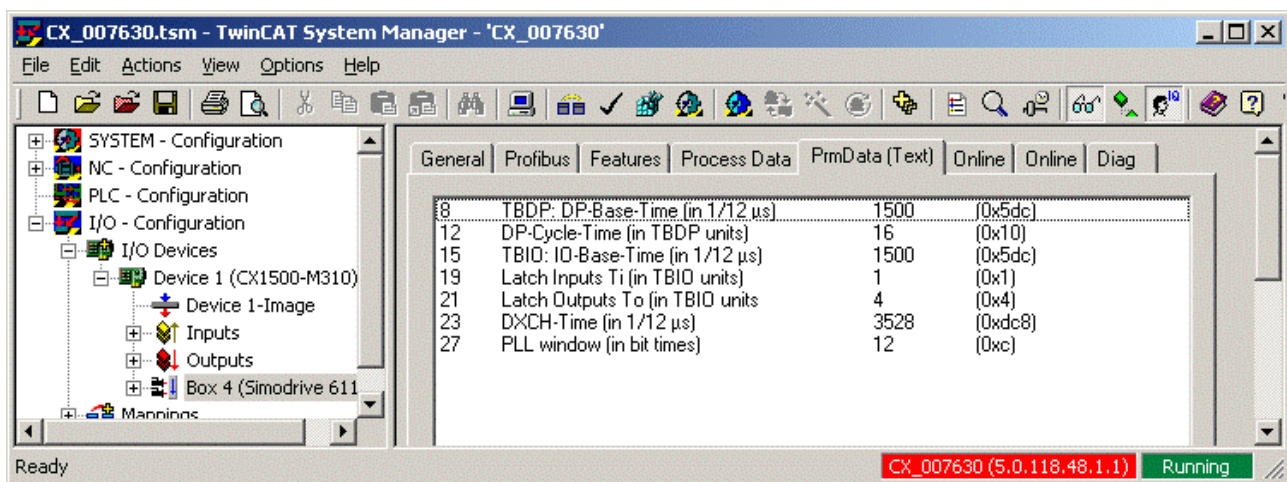
The profibus node address of the 611u drive is automatically scanned in.



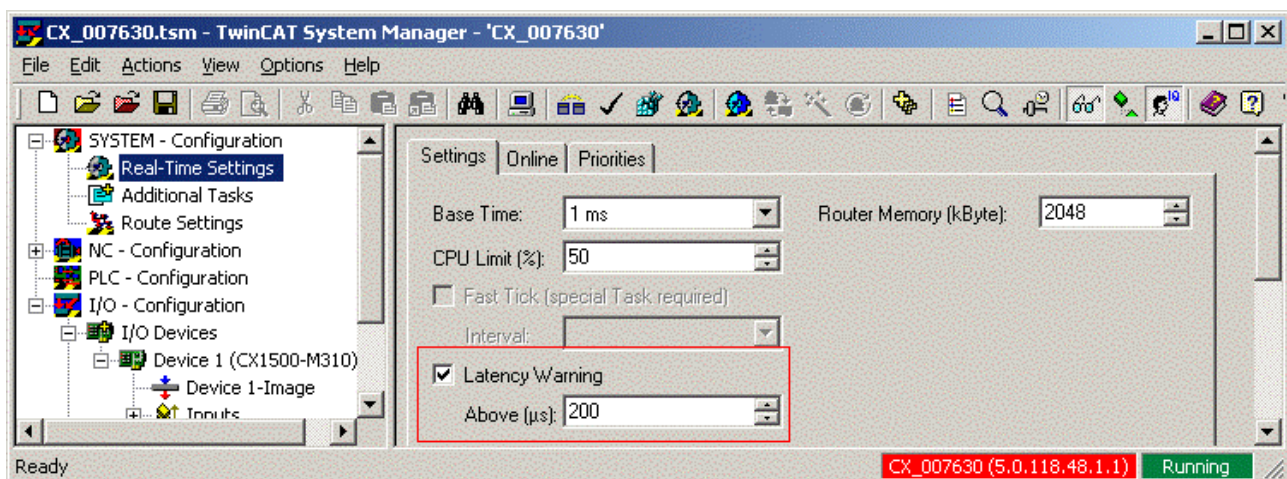
For asynchronous communication it is required to activate the PKW interface. For the proper function of the profibus it is important to setup the telegram type of the 611u in the System Manager as it is setup in the drive. If the telegram type is changed then this must be done and saved in the drive and in the System Manager and the NC axes needs to be linked to the drive again. On a double drive also the telegram type of the B drive needs to be adjusted.



The PLL Window for the synchronization in the drive is set to 12 bit-times = 1us, which is the standard setup for a 611u.



The CX1500-M310 requires that the latency warning is activated. The TwinCAT jitter is higher than usual, if Profibus MC is used because TwinCAT must adjust to the Profibus Master (Sync Master Mode). The latency warning should be set to a large value like 200us.



At the end activate the configuration on the CX1000 and start the TwinCAT System.

9.3 DriveCom Configuration for the CX1500-M310

Get the TwinCAT Configuration of the CX1000

The TcDriveComCfg tool can be used to configure the OPCDriveCOM-Server. Since the server and the configuration tool are installed on the PC it is necessary to get the CX1000-configuration file to the PC.

Put the local TwinCAT System on the PC to Config Mode and choose either A) or B) to get the CX1000 configuration to the PC.

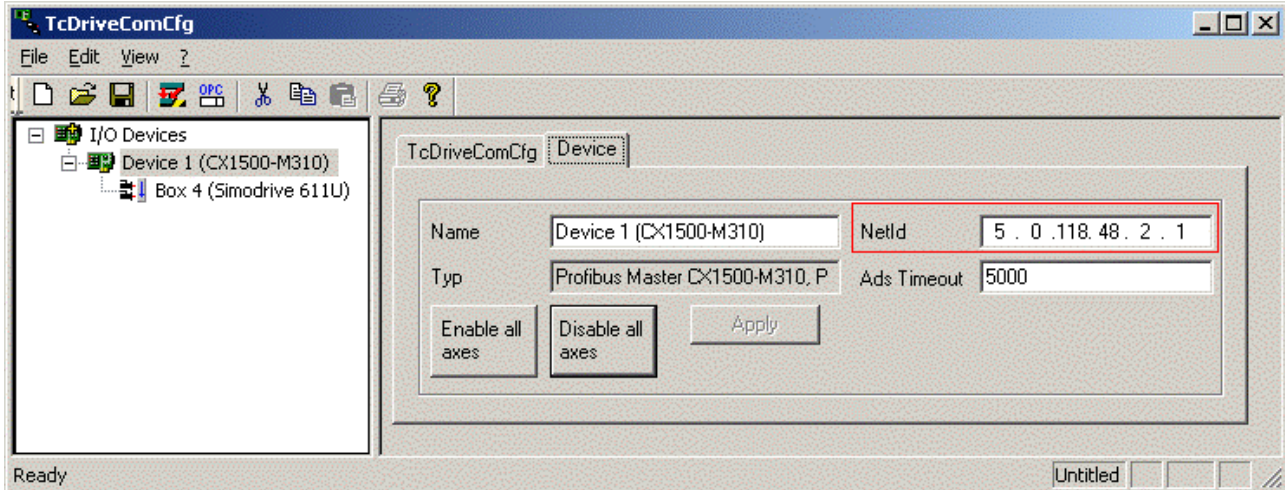
A) Use a memory stick or network drive to copy the `C:\TwinCAT\Boot\CurrentConfig.xml` and `C:\TwinCAT\Boot\CurrentConfig.tsm` from the CX1000 to the same folder on the PC.

B) Use the System Manager

- Open the System Manager with a new project
- Select the CX1000 as the target system (System Configuration | Choose Target)
- Choose "File | Open from target", now the CX1000 configuration appears. The System Manager status bar shows in red "CX_00xxxxx".
- Choose the local system as target (System Configuration | Choose Target). The System Manager status bar shows in gray "local".
- Activate the CX1000 configuration to the local PC but DO NOT START the local system, press cancel when asked to restart the TwinCAT runtime system.

Now after having the CX1000 configuration on the PC in the `C:\TwinCAT\Boot` folder, it is not permitted to start the local system. Stay in Config Mode.

Start the TcDriveComCfg tool. Use "File | Read TwinCAT Configuration" or the Scan Configuration button in the toolbar to read the configuration data. The configuration tool now shows the CX1500-M310 Profibus Master with the proper AdsNetID and the attached drive with the proper Profibus node address. Increase the Ads Timeout to 5000ms = 5s and apply.



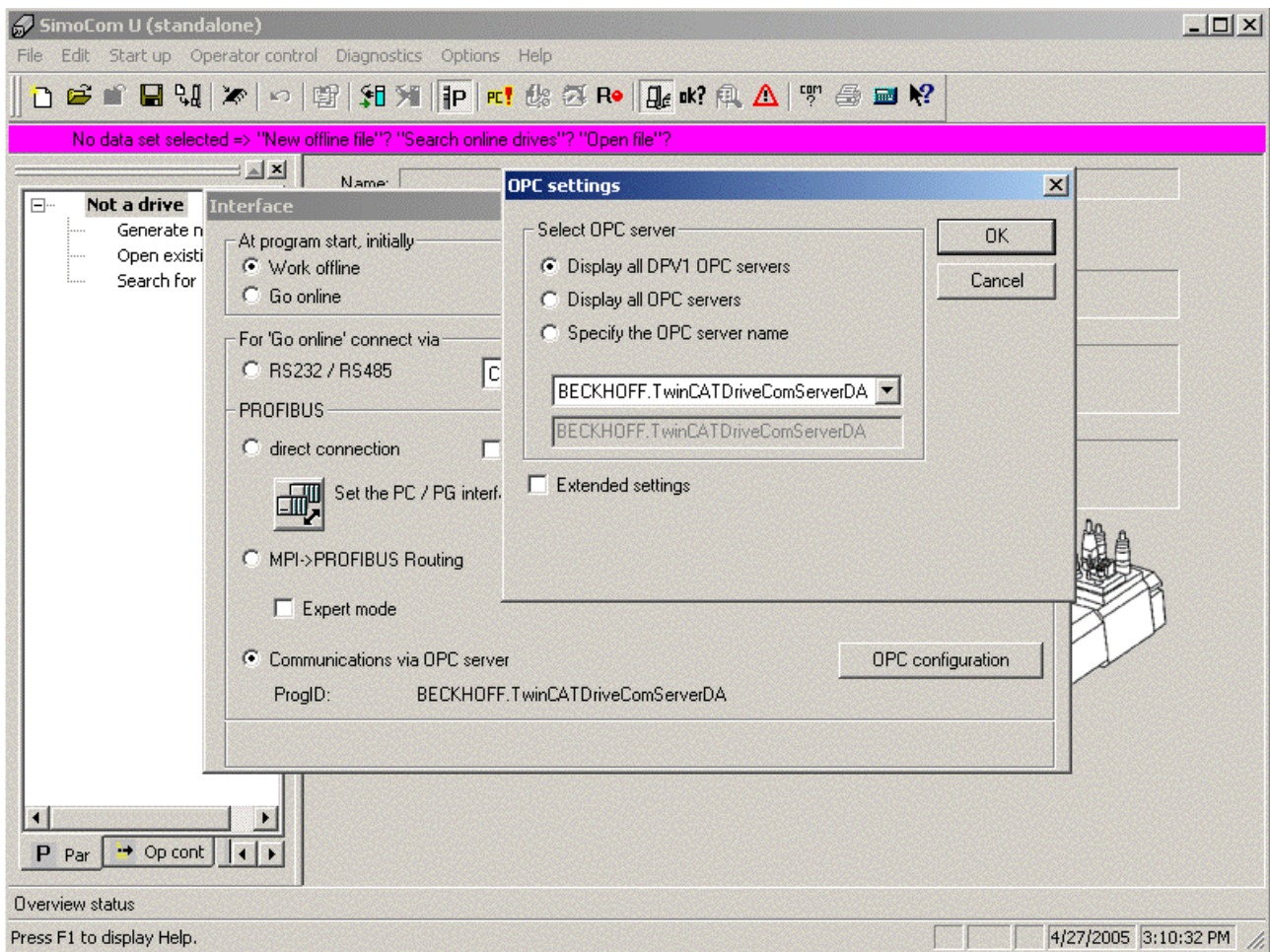
Save the file and activate the configuration.

Now the OPCDriveCom-Server is activated on the PC and allows for accessing the parameters of the drive by SimoComU via OPC.

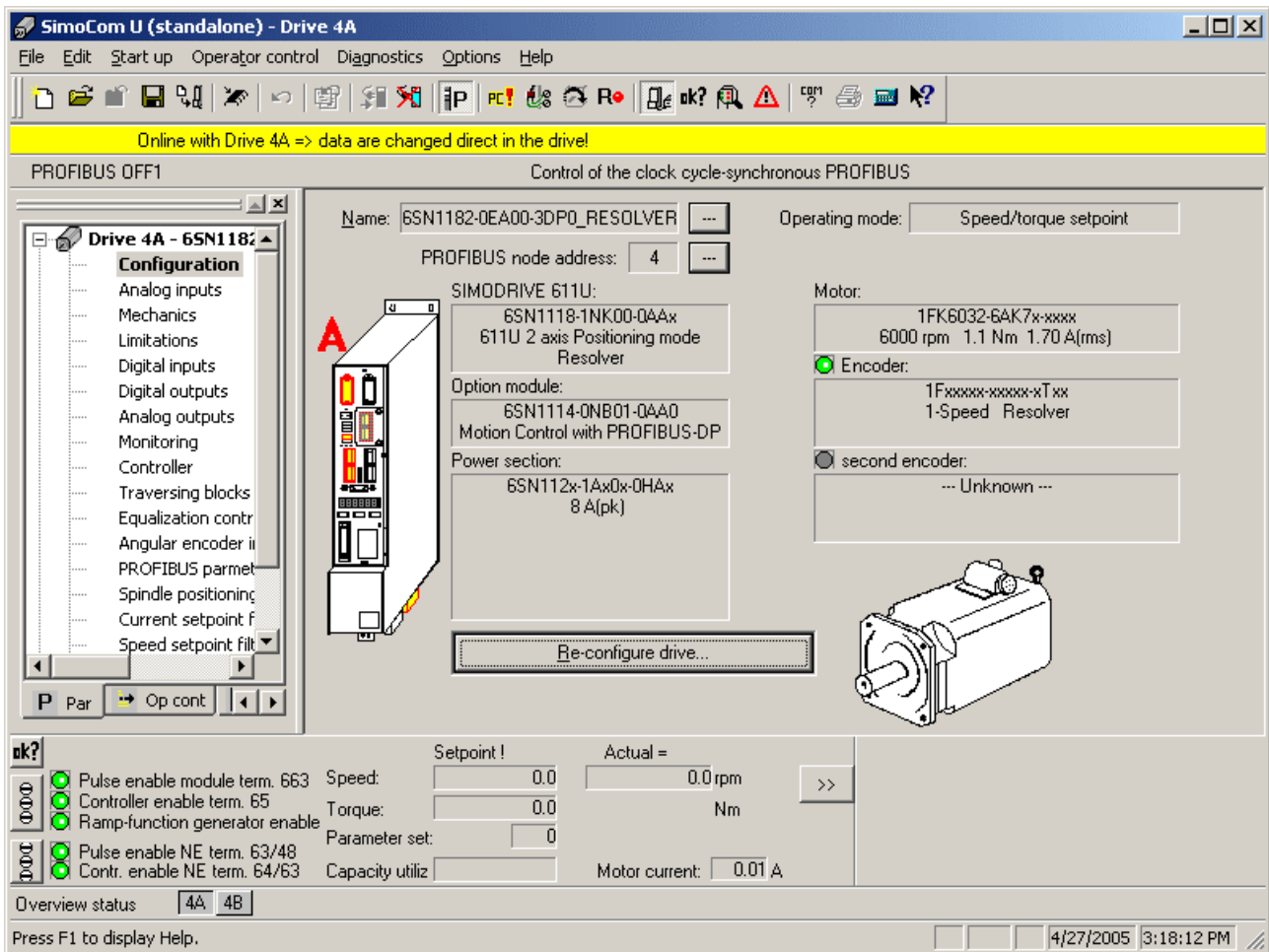
Start SimoComU and open the communication setup (Options | Settings | Communication).

All communication goes over Profibus, therefore TwinCAT System on the CX1000 needs to be running with the attached Profibus. The 611u drive needs to be running (operational) and communication with the CX1500-M310 without errors.

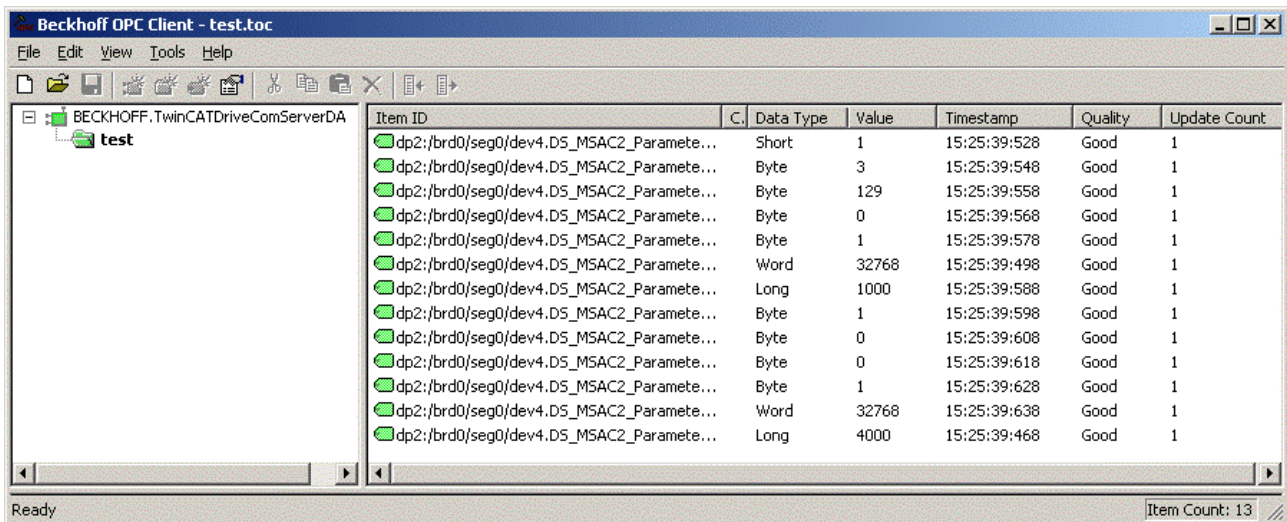
Choose "Communication via OPC server" and select the "BECKHOFF.TwinCATDriveComServerDA". If the server does not appear, it has to be registered. In order to register the OPCDriveCom-Server run the batch file "`C:\TwinCAT\OPC\DRIVECOM Server\RegisterServer.BAT`".



Search for drives online with "Go Online".



In case of problems with communication via OPC ensure that the OpcDriveCom server is stopped when the SimuComU is stopped and started when the SimuComU is started. Additionally, the TcOpcClient can be used to check the access via OPC.



In case of a bad connection, it is recommended to close the TwinCAT System Manager.

More Information:

www.beckhoff.com/en-en/products/automation/twincat/tsxxx-twincat-2-supplements/

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