SIEMENS

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Operating SINAMICS S120 on a SIMATIC S7-1500 via a Technology Object

TIA Portal V13 SP1 / SIMATIC S7-1500 / SINAMICS S120

https://support.industry.siemens.com/cs/ww/de/view/109482718

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How do you operate the SINAMICS S120 drive via a technology object (TO) on a SIMATIC S7-1500?

2 Answer

2.1 Overview

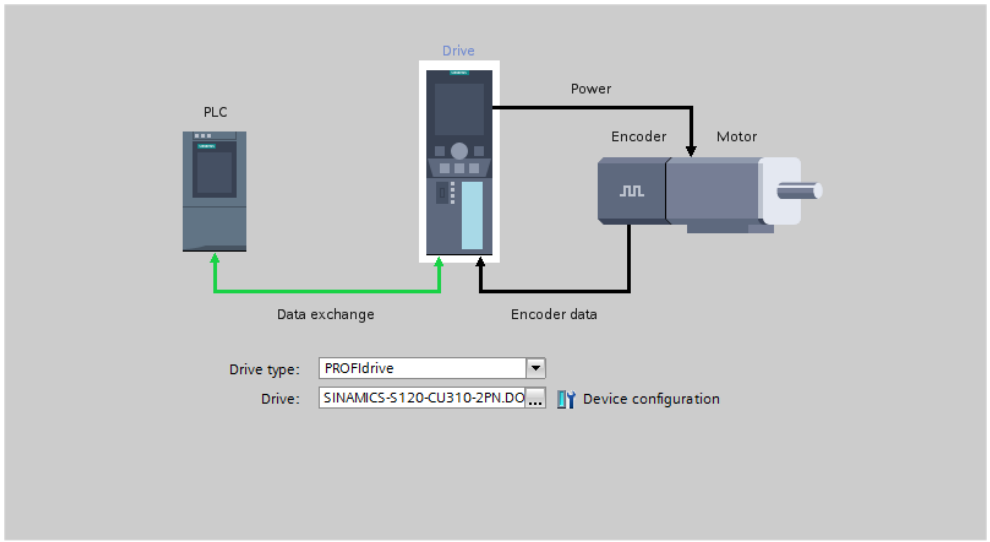
With the SIMATIC S7-1500 there is a simple way of controlling PROFIdrive drives via the integrated technology objects (TOs). This FAQ response takes the example of the SINAMICS S120 drive system to demonstrate this.

2.2 Detailed Description

With the SIMATIC S7-1500 there is a simple way of controlling drives via the integrated technology objects (TOs). Here SIMATIC S7-1500 supports drives with the following types of connection:

- Analog:
  Control of the drive via an analog speed setpoint of 0..10V.
- PROFIdrive:
  Control of the drive via PROFIdrive telegrams.

Figure 2-1 Selection of the drive connection type



Below we show the example of a SINAMICS S120 connection to the SIMATIC S7-1500 via PROFIdrive profile.

The requirement for using the SINAMICS S120 in the TIA Portal is the complete configuration and commissioning of the drive with the commissioning software SINAMICS MICROMASTER STARTER. You can download the latest version of

the commissioning software as required from the following Siemens Industry Online Support link:

- SINAMICS MICROMASTER STARTER
  https://support.industry.siemens.com/cs/en/en/view/26233208

When commissioning the SINAMICS S120 using the commissioning software SINAMICS MICROMASTER STARTER, you must have already selected, configured and optimized the connected motor. Likewise, you must have already defined the desired PROFIdrive telegram for the communication with the SIMATIC S7-1500. The SIMATIC S7-1500 supports the following telegrams for this:

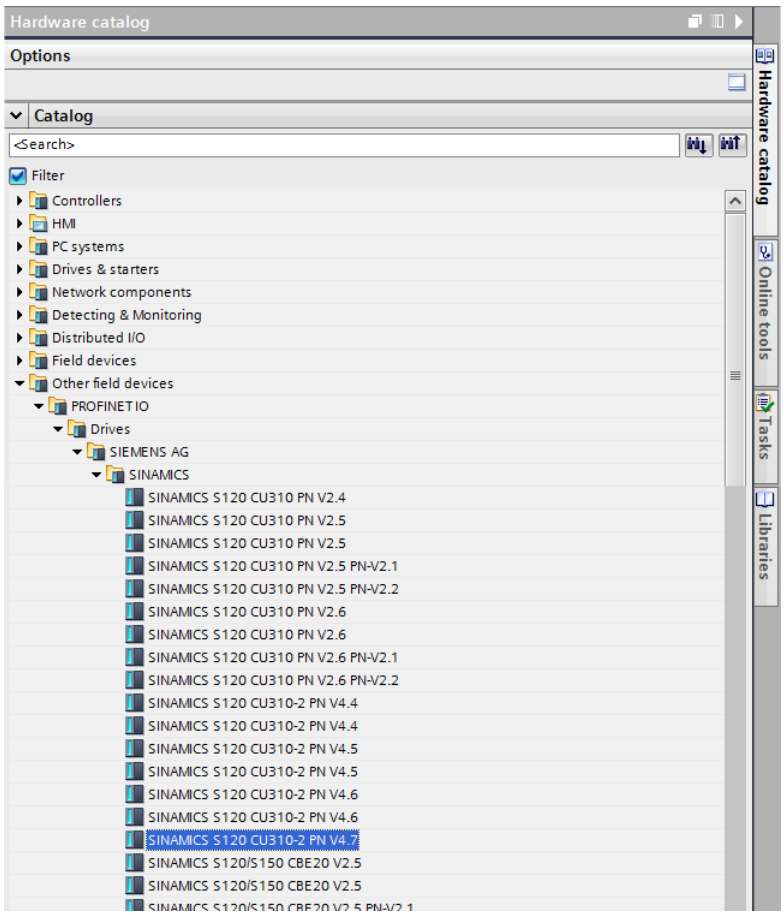
- Telegram 1:
  Transfer of the speed setpoint in 16-bit resolution.
- Telegram 2:
  Transfer of the speed setpoint in 32-bit resolution.
- Telegram 3:
  Additional feedback of the encoder value for controlled positioning.
- Telegram 5:
  Feedback of the encoder value and transfer of the error signal and the position controlling gain for utilization of DSC (Dynamic Servo Control) in the drive with a view to improving control quality.

Figure 2-2 Telegrams supported by technology objects of S7-1500

		PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10	PZD 11	PZD 12	PZD 13	PZD 14	PZD 15
Telegram 1	CPU ► Drive	STW 1	NSOLL													
	Drive ► CPU	ZSW 1	NIST													
Telegram 2	CPU ► Drive	STW 1	NSOLL		STW 2											
	Drive ► CPU	ZSW 1	NIST		ZSW 2											
Telegram 3	CPU ► Drive	STW 1	NSOLL		STW 2	G1 STW										
	Drive ► CPU	ZSW 1	NIST		ZSW 2	G1 ZSW	e.g. G1 XIST1		e.g. G1 XIST2							
Telegram 5	CPU ► Drive	STW 1	NSOLL		STW 2	G1 STW	XERR		KPC							
	Drive ► CPU	ZSW 1	NIST		ZSW 2	G1 ZSW	e.g. G1 XIST1		e.g. G1 XIST2							

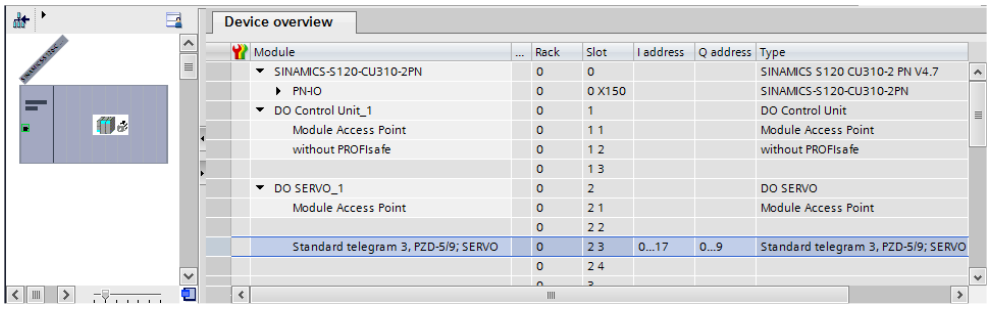
Once the SINAMICS S120 is completely commissioned the drive can now also be transferred to the hardware configuration of the TIA Portal. The SINAMICS S120 is already available as an additional field device in the hardware catalog of the TIA Portal and you can incorporate it in the hardware configuration by drag-and-drop.

Figure 2-3 Selection of the SINAMICS S120 in the hardware catalog of the TIA Portal



Then you must assign the inserted drive the same telegram configuration as already stored in the drive via the commissioning software SINAMICS MICROMASTER STARTER.

Figure 2-4 Inserting the telegram configuration in the TIA Portal



If multiple drives with an extensive telegram configuration are to be integrated in the TIA Portal, the entry below shows you how in the commissioning software SINAMICS MICROMASTER STARTER you generate GSD files for the drives you have configured and integrate them in the TIA Portal:

- SINAMICS G/S: Generating GSDML files for S120, S150, G130, G150
  https://support.industry.siemens.com/cs/ww/en/view/92022677

If you use the PROFIdrive telegram 5 for the drive, it is imperative that you connect the SINAMICS S120 isochronous with the SIMATIC S7-1500. Detailed information about this is available in the following entries:

- How Do You Integrate a Drive in the TIA Portal via the Device Master File (GSD)?
  https://support.industry.siemens.com/cs/en/en/view/73257075
- Isochronous mode - an example with SIMATIC S7-1500
  https://support.industry.siemens.com/cs/en/en/view/109480489

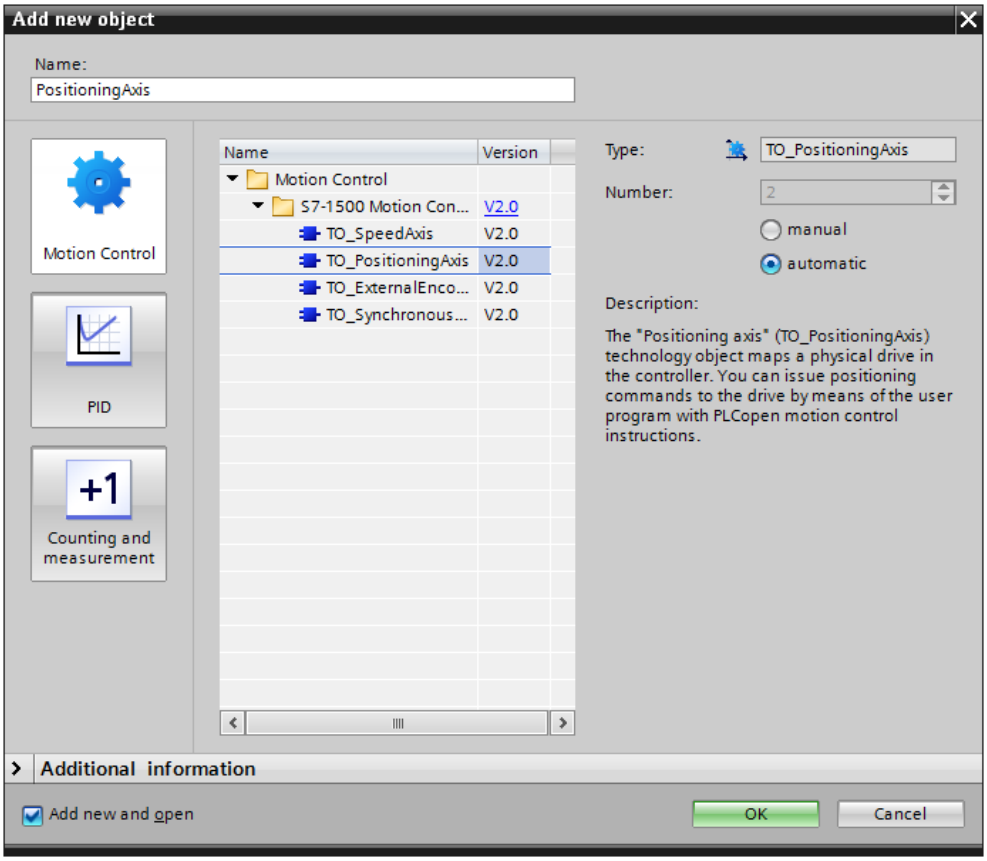
After compilation of the hardware configuration the drive is now completely integrated in the TIA Portal and can be linked to a technology object.

For this you create a corresponding technology object in the SIMATIC S7-1500. For this the S7-1500 provides the following technology objects for linking a drive:

- TO_SpeedAxis
  Speed axis for pure speed specification on the drive.
- TO_PositioningAxis
  Positioning axis for position-controlled operation of the drive.
- TO_SynchronousAxis
  Synchronous axis for connected operation of two axes via a master-slave relationship in which the slave axis must be of the TO_SynchronousAxis type.

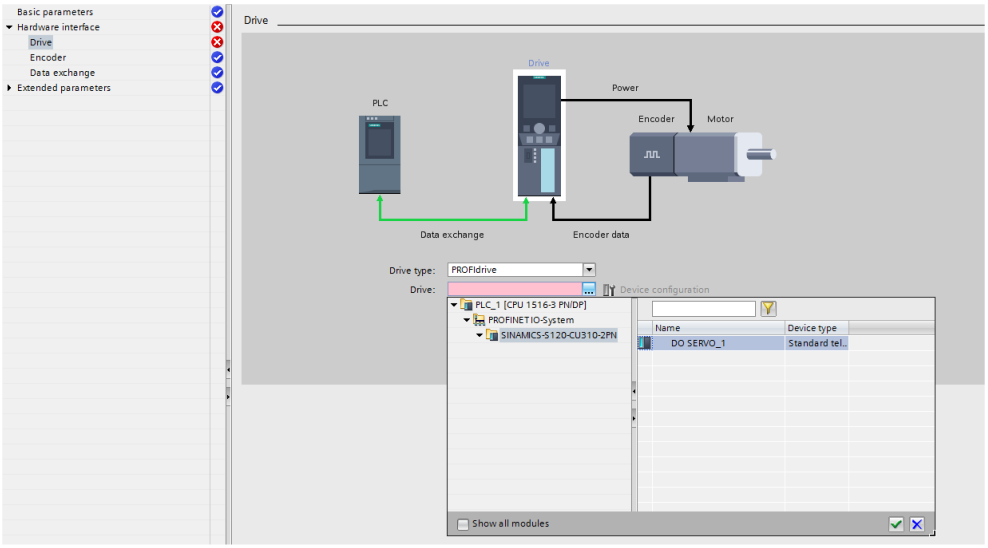
This FAQ response takes an example with a positioning axis as technology object.

Figure 2-5 Selection of the technology object



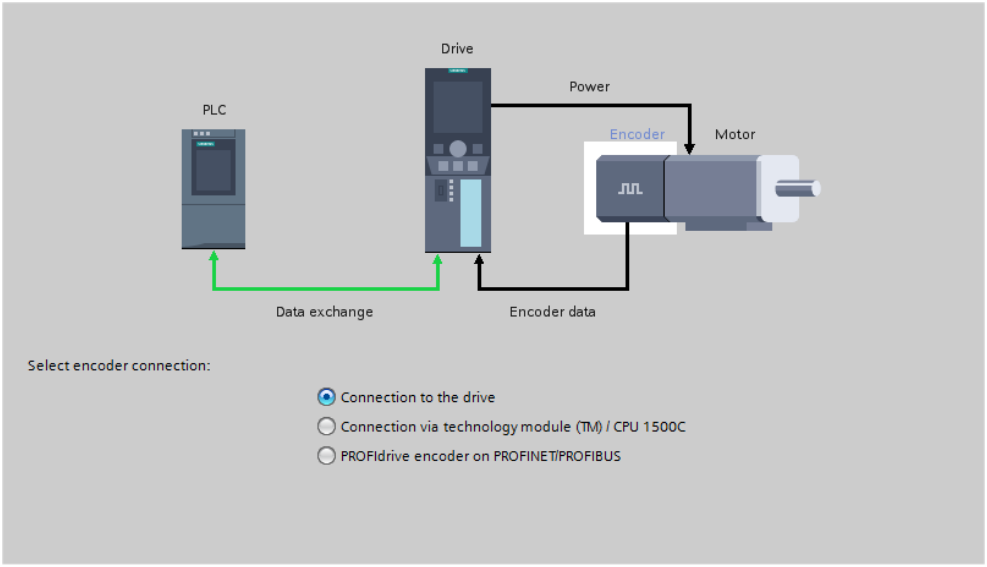
Now connect the technology object just created to the configured drive by selecting the SINAMICS S120 from the technology object drop-down list box. Make sure however that PROFIdrive is selected as the type of connection for the drive.

Figure 2-6 Connecting the technology object to the drive



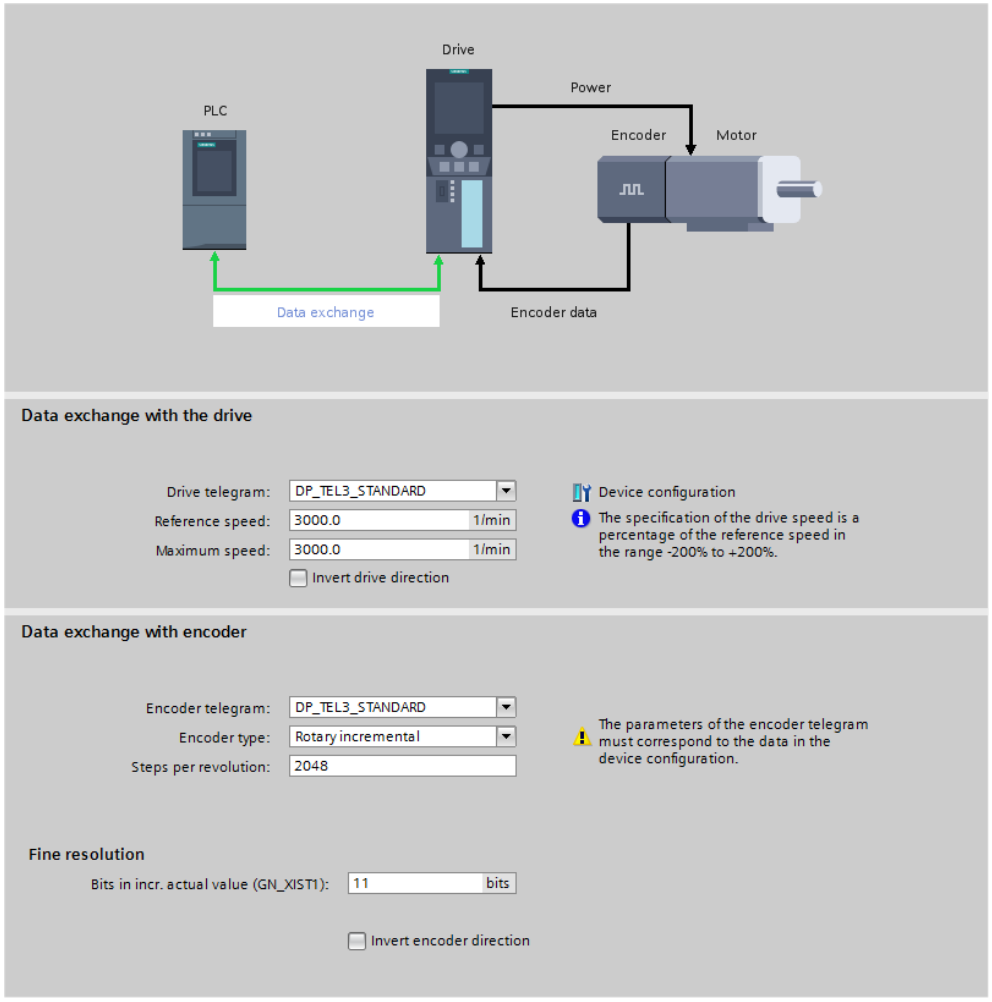
Now specify how the encoder of the selected axis is connected to the SIMATIC S7-1500.

Figure 2-7 Selection of the encoder connection



To conclude you must transfer the encoder settings from the drive to the technology object.

Figure 2-8 Making the encoder settings on the technology object



The settings can be taken from the following parameters from the commissioning software SINAMICS MICROMASTER STARTER:

Parameter designation TIA Portal	Parameter STARTER	Sample value in the figure
Data exchange with the drive		
Drive telegram	p2079	DP_TEL3_STANDARD
Reference speed	p2000	3000.0
Maximum speed	p311[0]	3000.0
Data exchange with encoder		
Encoder telegram	p2079	DP_TEL3_STANDARD
Encoder type	p400	Rotary incremental
Steps per revolution	p408[0] or r979[2]	2048
Bits in incr. actual value (GN_XIST1)	p4108[0] or r979[3]	11
Invert encoder direction	p410[0]	No

Now you can control the drive via the PLCopen functions of the SIMATIC S7-1500 using the technology object.

2.3 Further Information

More information about using the technology objects of the SIMATIC S7-1500 is also available in the following entries:

- SIMATIC S7-1500:
  Introduction to the functions and configuration and programming of the S7-1500 controller family in the form of a "Getting Started"
  https://support.industry.siemens.com/cs/en/en/view/78027451
- SINAMICS G:
  Control of speed of a G110M / G120 (Startdrive) with S7-1200 (TO) via PROFINET or PROFIBUS DP with Safety Integrated (via terminal) and HMI
  https://support.industry.siemens.com/cs/en/en/view/78788716
- SINAMICS G:
  Positioning of a G110M/G120 (Startdrive) with S7-1500 (TO) via PROFINET/PROFIBUS with Safety Integrated and HMI
  https://support.industry.siemens.com/cs/en/en/view/81666970