Siemens Simatic S7 Driver for Tridium Niagara

User Guide

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niagara4

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Contents

1 Introduction **2**

2 Requirements **3**

3 Quick Start **3**

4 Simatic Network **4**

5 Simatic Devices **5**

6 Simatic Points **6**

7 PLC Control **8**

8 TIA Portal Configuration (S7-1200/1500) **8**

9 FAQ **9**

9.1 What rack and slot numbers should I use? 9

9.2 Do I need to enable any settings on the PLC side? 9

9.3 Can I access optimized Data Blocks on S7-1500? 10

9.4 I cannot connect to the PLC 10

9.5 Points show incorrect values 10

1 Introduction

The Siemens[1] Simatic S7 driver for Tridium Niagara provides robust integration between industrial automation systems and building management systems. It communicates via the native S7comm protocol over standard Ethernet, connecting directly to PLCs with integrated Ethernet ports or communication processors (CP343/CP443).

The driver provides comprehensive access to all PLC memory areas: Inputs (I), Outputs (Q), Memory bits (M), Data Blocks (DB), Timers (T), and Counters (C). It supports reading and writing of bits, bytes, words, and double words with optimized block transfer to minimize network traffic.

The Simatic S7 family represents a global standard in industrial automation, with millions of units installed across every industrial sector. Modern S7 controllers support gigabit Ethernet speeds for real-time data exchange essential for facility-wide optimization.

Supported CPU models and features:

Function	S7-300	S7-400	WinAC	S7-1200[2]	S7-1500[3]	LOGO[4]	S7-200[5]
DB Read/Write	X	X	X	X	X	X	X
I Read/Write	X	X	X	X	X	X	X
Q Read/Write	X	X	X	X	X	X	X
M Read/Write	X	X	X	X	X	X	X
T Read/Write	X	X	X	-	-	-	-
C Read/Write	X	X	X	-	-	-	-
PLC Date/Time[6]	X	X	X	-	-	-	-
PLC Status	X	X	X	-	-	-	-
Read SZL[7]	X	X	X	-	-	-	-
Get AG Block Info[8]	X	X	X	-	-	-	-
DB Get[9]	X	X	X	-	-	-	-

[1] All trademarks or registered trademarks are the property of their respective owners
[6] Function is in beta testing stage
[7] Function is in beta testing stage
[8] Function is in beta testing stage
[9] Function is in beta testing stage

Function	S7-300	S7-400	WinAC	S7-1200[2]	S7-1500[3]	LOGO[4]	S7-200[5]
Control Run/Stop	X	X	X	-	-	-	-
Security Function[10]	X	X	X	-	-	-	-

2 Requirements

- Niagara-powered device with software v4.8 or later, such as JACE, Supervisor, or any OEM version
- Simatic S7 driver module and license
- Siemens S7 PLC with Ethernet connectivity (integrated or via CP343/CP443)
- TCP/IP connectivity between the Niagara host and the PLC
- PLC configuration via **TIA Portal** (for S7-1200/1500 Data Block access)

3 Quick Start

1. Copy simatic-rt.jar module to Niagara /modules folder and restart the software.
    a. If the driver is hosted on PC: restart Supervisor station.
    b. If the driver is hosted on JACE: restart JACE from the platform.
2. Open the station in Workbench.
3. Open the **Palette** and locate the **simatic** palette.
4. Drag and drop **SimaticNetwork** from the palette onto the **Drivers** container in the station.
5. Enter license code in **License** property under **SimaticNetwork**.
6. Add a **SimaticDevice** under the network.
7. Configure the device properties (IP address, rack, and slot of the PLC).
8. Add points manually by specifying the memory area, data type, and byte offset.

[10] Function is in beta testing stage
[2] Optimized block access must be disabled
[3] Optimized block access must be disabled
[4] The entire memory is mapped in the V Area, accessible as DB 1 from the outside
[5] The entire memory is mapped in the V Area, accessible as DB 1 from the outside

4 Simatic Network

The Simatic Network manages TCP/IP connections to one or more S7 PLCs.

Network properties:

- **License** – the code that allows the driver to run on your host.
- **Poll Frequency** – interval between point read cycles.

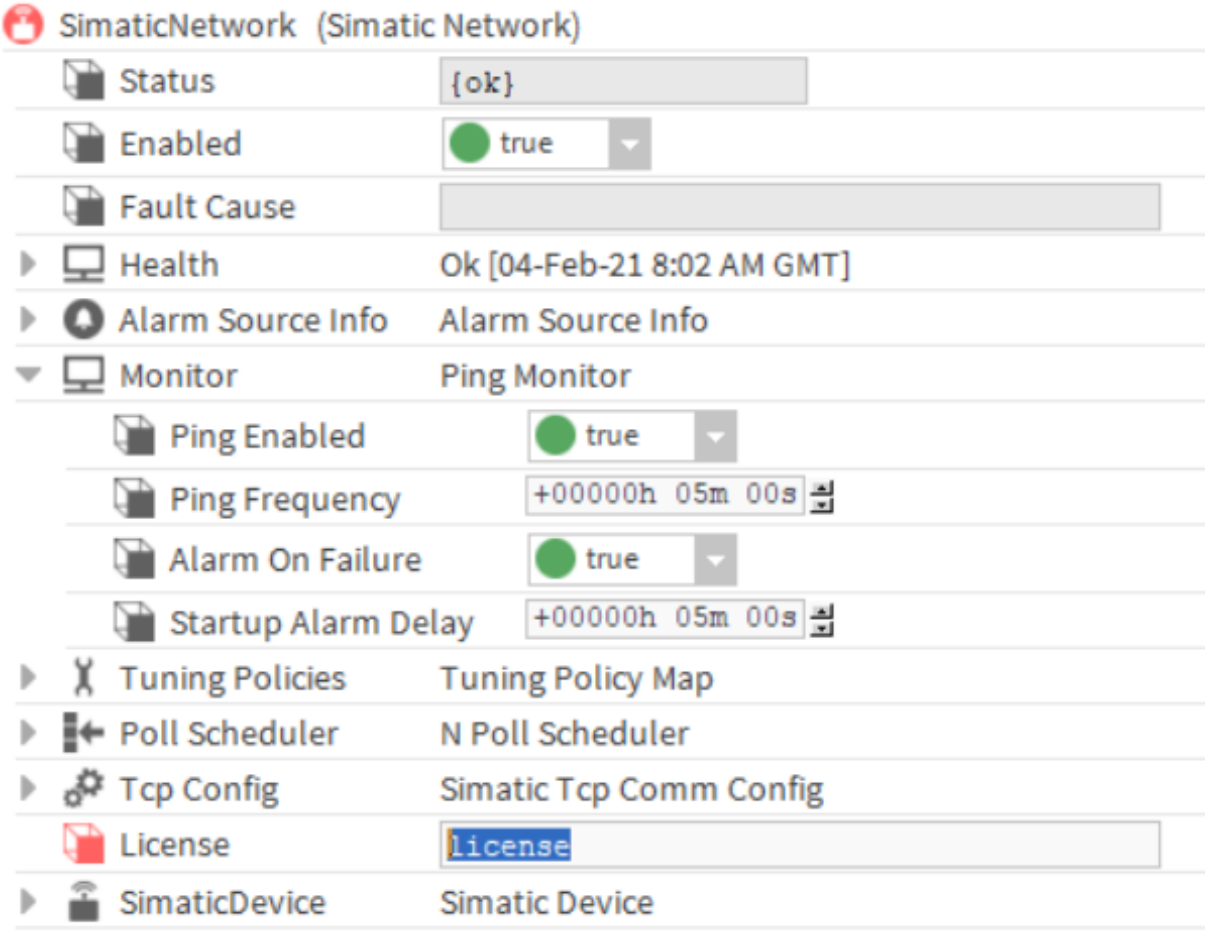


Figure 1: SimaticNetwork properties

In most cases only the **License** value needs to be configured at the network level.

5 Simatic Devices

Open the **Device Manager** and press **New** to add a **SimaticDevice**. Each device represents a single S7 PLC. The driver is compatible with the entire S7 family:

S7-1200	S7-1500	S7-300	S7-400
WinAC	LOGO	S7-200	CP343
CP443			

For LOGO and S7-200 controllers, the entire memory is mapped in the V Area and is accessible as DB 1 from the outside.

Device properties:

- **Ip Address** – IP address and port of the PLC in format `ipAddress:port` (default port 102).
- **Session Password** – PLC session password, if configured on the PLC side.
- **Rack** – rack number (typically 0).
- **Slot** – slot number of the CPU (typically 0 for S7-1200/1500, or 2 for S7-300/400).
- **Poll Frequency** – polling rate for this device: Fast, Normal, or Slow.
- **Cpu Status** – displays the current PLC state (Run or Stop).
- **Order Code** – PLC model identifier, read from the PLC (e.g., 6ES7 212-1BE40-0XB0).
- **Firmware Version** – PLC firmware version, read from the PLC.

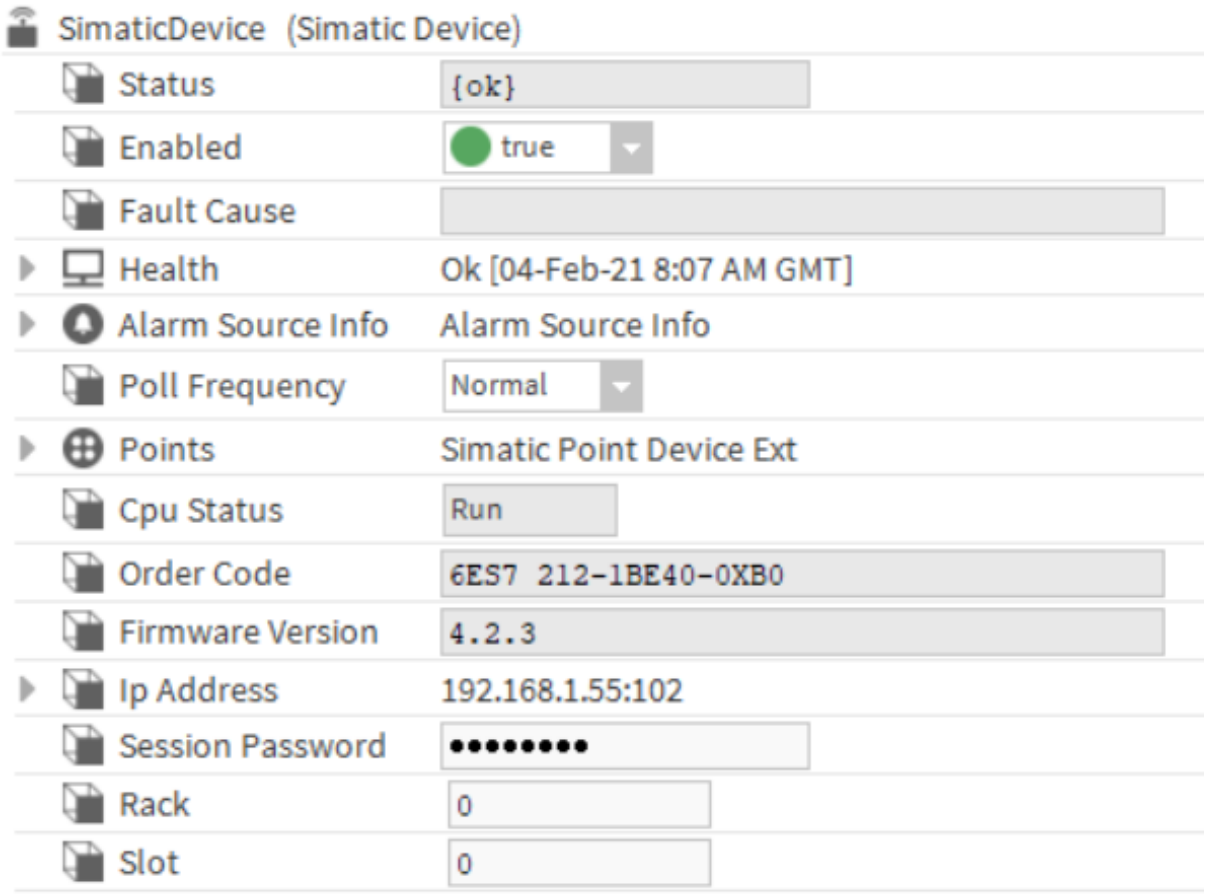


Figure 2: SimaticDevice properties

If the device is shown offline, right-click on the device and ping it to verify connectivity.

6 Simatic Points

Points are configured by specifying the PLC memory area and address. The driver supports the following memory areas:

- **I** – Inputs (digital and analog input modules).
- **Q** – Outputs (digital and analog output modules).
- **M** – Memory bits (internal PLC memory).
- **DB** – Data Blocks (structured data storage).
- **T** – Timers.
- **C** – Counters.

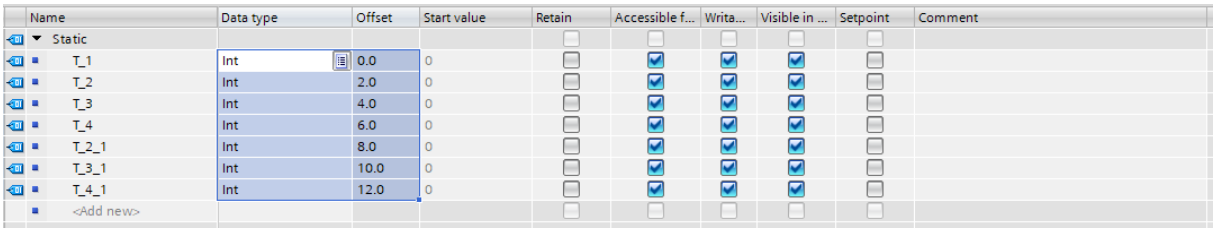
Each point is defined by its area, data type (bit, byte, word, or double word), and byte offset. For Data Block access, the DB number must also be specified.

Each point proxy extension contains the following properties:

- **Area** – memory area: I, Q, M, DB, T, or C.
- **Data Type** – Bit, Byte, Word, DWord, or Real.
- **DB Number** – Data Block number (only for DB area).
- **Byte Offset** – byte offset within the selected memory area. For DB memory area, offset is shown in the TIA Portal variable table. For other area types, offset is part of the point tag (e.g., for tag `%IW112` offset is 112).
- **Bit Number** – bit position within the byte (only for Bit data type, 0–7).
- **Signed** – whether the analog value is signed or unsigned.
- **Poll Frequency** – polling rate for this point.

Point addressing examples (TIA Portal tag to driver address):

- `%I0.0` – first input bit (Area=I, Offset=0, Bit=0)
- `%Q0.0` – first output bit (Area=Q, Offset=0, Bit=0)
- `%IW112` – input word at byte offset 112 (Area=I, Offset=112, Data Type=Word)
- `%MW100` – memory word at byte offset 100 (Area=M, Offset=100, Data Type=Word)
- `DB45` – Data Block 45 (Area=DB, DB Number=45)
- `%I1.6` – input bit 6 at byte 1 (Area=I, Offset=1, Bit=6)



Name	Data type	Offset	Start value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Comment
Static									
T_1	Int	0.0	0						
T_2	Int	2.0	0						
T_3	Int	4.0	0						
T_4	Int	6.0	0						
T_2_1	Int	8.0	0						
T_3_1	Int	10.0	0						
T_4_1	Int	12.0	0						
<Add new>									

Figure 3: TIA Portal variable table showing Data type and Offset columns

The driver supports both read and write operations. To write to a point, add it as a writable type (e.g., **Numeric Writable** or **Boolean Writable**). Written values are sent directly to the configured PLC memory address.

Real-time PLC status monitoring includes RUN/STOP state and diagnostic information.

The S7 driver does not support automatic point discovery. Points must be added manually based on the PLC program documentation (e.g., TIA Portal symbol table or variable table).

7 PLC Control

The driver provides remote PLC control capabilities:

- **Start/Stop** – remote PLC start and stop commands.
- **Time Synchronization** – synchronize PLC clock with the Niagara station time.

8 TIA Portal Configuration (S7-1200/1500)

To access Data Blocks on S7-1200 and S7-1500, two settings must be configured in TIA Portal:

1. Only global DBs can be accessed.
2. The optimized block access must be turned off.
3. The access level must be “full” and the “connection mechanism” must allow GET/PUT.

DB property: select the DB in the left pane under “Program blocks” and press Alt-Enter (or in the contextual menu select “Properties…”). Uncheck “Optimized block access” (enabled by default).

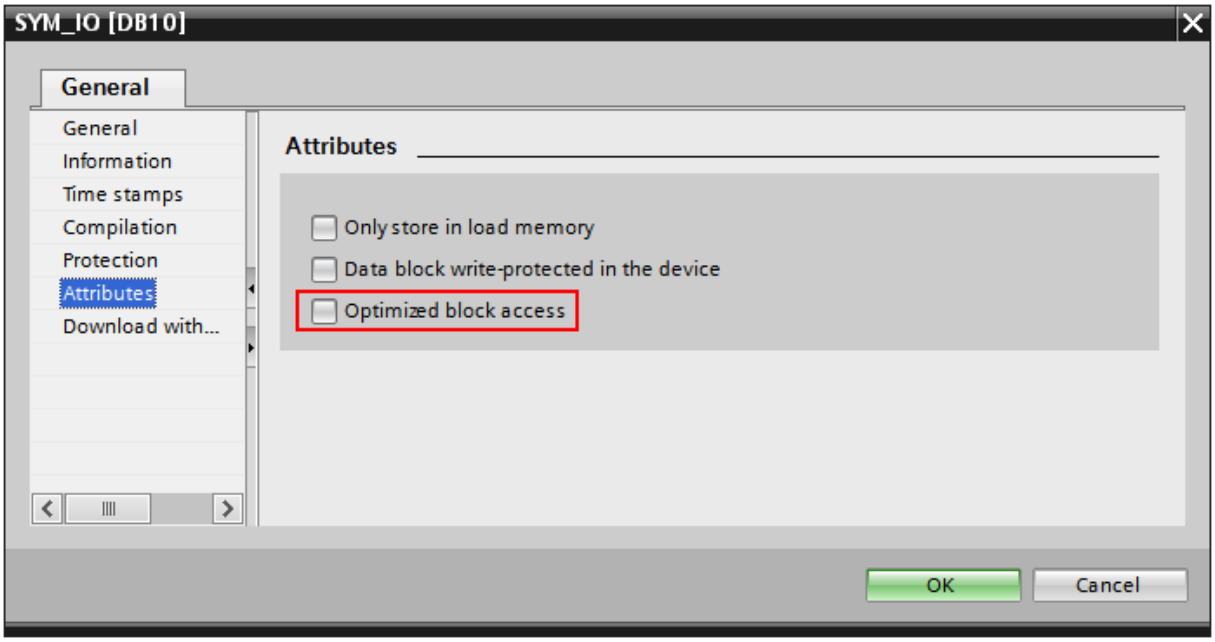


Figure 4: DB Properties

Protection: select the CPU project in the left pane and press Alt-Enter (or in the contextual menu select “Properties…”). In the item Protection, select “Full access” and check “Permit access with PUT/GET….” as shown below.

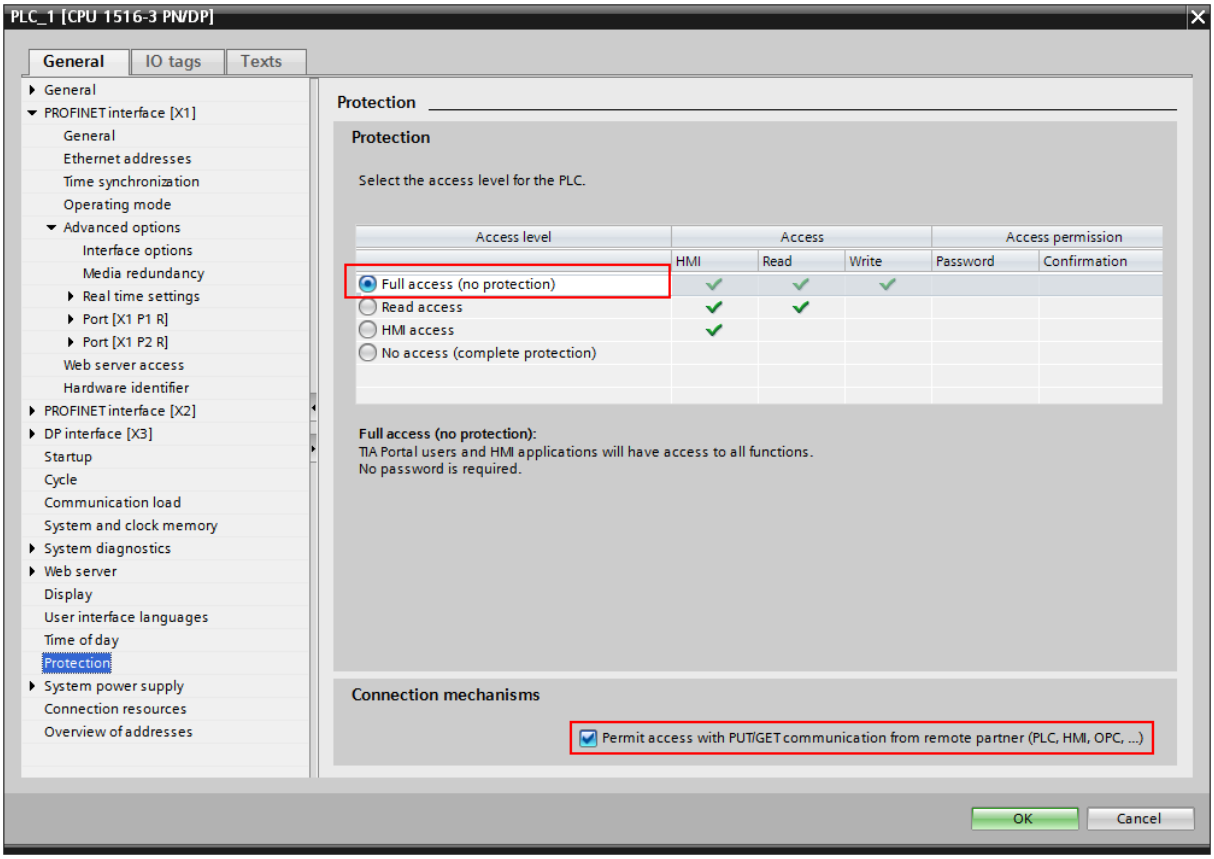


Figure 5: Protection

9 FAQ

9.1 What rack and slot numbers should I use?

For S7-1200 and S7-1500: rack 0, slot 0. For S7-300 and S7-400: rack 0, slot 2 (the default CPU slot). These values may differ if the CPU is installed in a non-standard slot.

9.2 Do I need to enable any settings on the PLC side?

For S7-1200 and S7-1500, the “Permit access with PUT/GET” option must be enabled in the PLC hardware configuration under Protection settings.

9.3 Can I access optimized Data Blocks on S7-1500?

Optimized DB access is not supported by S7comm. Data Blocks must be created with “Optimized block access” disabled in TIA Portal.

9.4 I cannot connect to the PLC

- Verify the IP address of the PLC is correct and reachable (ping from the Niagara host).
- Verify the **Rack** and **Slot** values match the PLC configuration.
- For S7-1200 and S7-1500, ensure “Permit access with PUT/GET” is enabled in the PLC hardware configuration.
- Check that the license is valid.

9.5 Points show incorrect values

- Verify the **Area**, **Data Type**, **DB Number**, and **Byte Offset** match the PLC variable table.
- For floating point values, ensure the data type is set to Real, not DWord.
- S7 uses big-endian byte order – verify byte offsets in TIA Portal or STEP 7.