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LOGO! S7 Connection with LOGO! Client and S7-1200/1500 Server

LOGO! 8; S7-1200; S7-1500; STEP 7; TIA Portal

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1 Introduction and Task Description

This application example offers a completely configured S7 connection for LOGO! 8 ("LOGO!" for short) for communication with a SIMATIC S7 controller. You will use a LOGO! switching program connected to an S7 project, where you can test the connection and can freely expand it.

In this application example, an S7-1212C is used as an example and demonstrates how you can use the TIA Portal in the basic version. Please refer to the TIA Portal manual [\6\](#).



WARNING

This example demonstrates the functional implementation with LOGO!. Possible requirements regarding functional safety (e.g. EMERGENCY stop) are not part of this example. The user is responsible for compliance with the relevant guidelines!

The integrated functions of LOGO! offer many additional possibilities to solve applications in various areas quickly and easily.

With LOGO!, prefabricated function blocks support project creation, e.g. weekly time switch, pulse generator, astro timer, seasonal time switch, stopwatch and simple logic gates.

The LOGO! text display (TDE) and the integrated web server of LOGO! offer additional options for operation and monitoring using function keys and message texts.

Advantages of LOGO! versus a conventional electrical installation

Using LOGO! offers you the following advantages:

- Extendibility of the software program to include further tasks.
In addition to the basic task description, additional independent subtasks can be configured depending on the application. For this purpose, LOGO! can be expanded with a wide variety of expansion modules.
- Straightforward, star-shaped arrangement of the wiring of the components.
- Use of simple switches (circuit breakers) or pushbuttons.
- Fewer components are required compared to a conventional solution.
- Communication options via Modbus/TCP, S7 connection, and KNX.

Target group

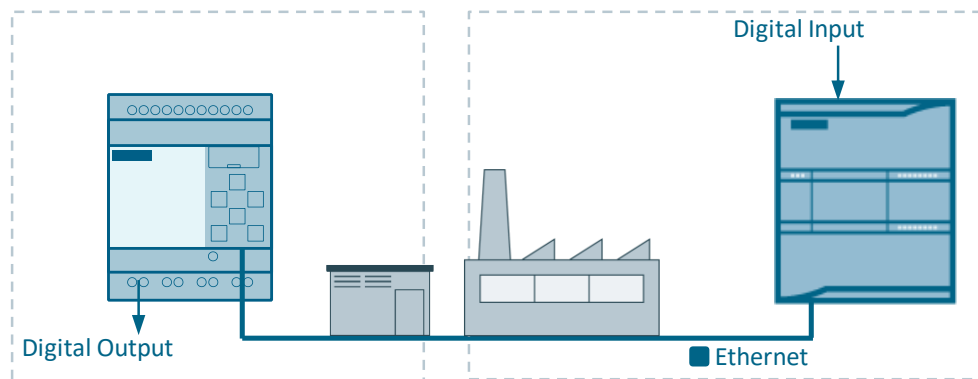
This application example is intended for specialists in electrical installations or automation.

Task description

The inputs and outputs of a LOGO! base unit should be switched over a long distance using the inputs and outputs of a SIMATIC S7 controller.

The respective inputs and outputs are not connected by individual cables or wires, but via an Ethernet cable, as shown in [Figure 1-1](#). The connection runs physically via Ethernet and is configured as an S7 connection.

Figure 1-1: Communication between S7 and LOGO! over a distance



Notes

If you want to establish a connection via the internet, a secure VPN connection is possible.

However, the VPN connection is not part of this application example, and the reader is referred to the relevant technical literature or information available online.

2 Components Used

The application example uses the LOGO! base unit and an economical SIMATIC S7-1212C industrial controller corresponding to [Table 2-1](#).

Table 2-1: Hardware and software components for the application example

Component	Quantity	Part number	Notes
LOGO!Soft Comfort V8.2 DVD	1	6ED1058-0BA08-0YA1	For upgrade to V8.2, see manual \3
LOGO! POWER 24 V/1.3 A	1	6EP3331-6SB00-0AY0	-
LOGO! 12/24 RCE	1	6ED1052-1MD08-0BA0	4 relay outputs
LOGO! TDE	1 ⁽¹⁾	6ED1055-4MH08-0BA0	Optional components
S7-1212C	1 ⁽²⁾	6ES7 212-1AE40-0XB0	Firmware V4.2 See manual \5
SITOP in SIMATIC S7-1200-Design 24 V, 2.5 A - PM1207	1 ⁽³⁾	6EP1332-1SH71	See manual \7

⁽¹⁾ LOGO! TDE is an optional component, see Section [2.1](#).

⁽²⁾ Generally, an S7-1200 or S7-1500 can be used.

⁽³⁾ The SITOP 24V is an example of a power supply suitable for general industrial use.

Notes

If you want to use the application example with a LOGO! 230RCE (for 230 V), you will find additional information under [\3](#) or under the entry "TDE Central Control for General Consumers":

- <https://support.industry.siemens.com/cs/ww/en/view/109755864>

The application example consists of this manual, a LOGO! V8.2 switching program, and a project for TIA Portal V16.

Table 2-2: Connectors for our application example

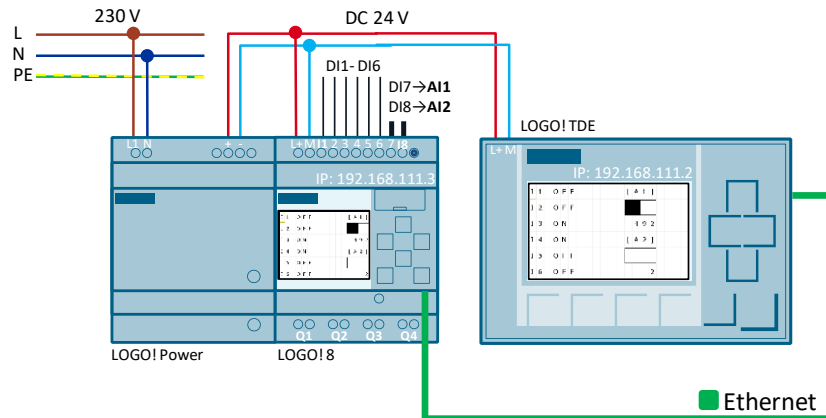
Component	File name	Notes
Documentation	109778776_LOGO!_Client_to_S7_Server_S7-Com_DOC_en.pdf	-
LOGO! switching program and S7 project	109778776_LOGO!_Client_to_S7_Server_S7-Com_CODE.zip	Requirements: LOGO!Soft Comfort V8.2 and TIA Portal V16.0

2.1 LOGO! 8 Hardware Setup

In addition to the manuals, you can find basic information below on commissioning the LOGO! 8 hardware used here.

[Figure 2-1](#) shows the hardware setup with LOGO!. The assignments of the digital input and output signals for LOGO! can be found in [Table 2-3](#).

Figure 2-1: Hardware setup for the application example (TDE optional)



In the LOGO!Soft Comfort settings, you can switch the digital inputs [DI7] and [DI8] as analog inputs [AI1] and [AI2].

Table 2-3: Input and output signals in LOGO!

IOs	Description
Inputs [DI1] to [DI6]	Digital button (N/O contact)
Input [DI7] ⁽¹⁾	Defined as analog input AI1
Input [DI8] ⁽¹⁾	Defined as analog input AI2
Outputs [Q1] to [Q4]	Digital outputs [1] to [4]

- ⁽¹⁾ **LOGO!SoftComfort V8** → [files]
 → [settings]
 → [I/O settings]
 → [On-board AI set.]
 → [2 AI activation]

Notes

For further information on mounting and wiring, please refer to the manual ([3](#)), Section: ([LOGO! mounting and wiring](#)).

Follow the connection instructions in the product information supplied with your device.

LOGO! TDE

The external text display LOGO! TDE for LOGO! provides you with an inexpensive and central user interface for your applications.

You can adjust parameters and use the LOGO! TDE for troubleshooting.

The configuration of LOGO! TDE and the internal LOGO! display is done using the same function block.

The use of the TDE allows the display of all messages via the integrated web server and thus also the control of applications via a smartphone.

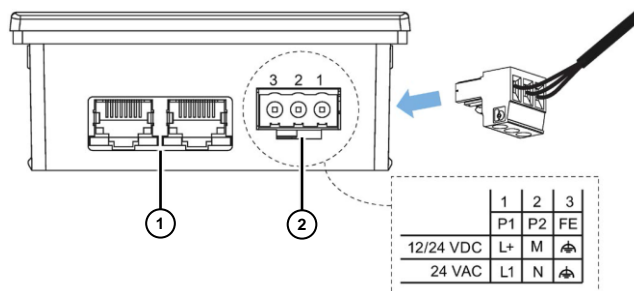
Connecting LOGO! TDE

The LOGO! TDE must be operated with a voltage of 12V DC or 24V AC/V DC and is installed separately. Siemens recommends protecting the LOGO! TDE by means of an 0.5 A fuse at the power supply.

The voltage connection is not polar. If you connect a DC power supply to the LOGO! TDE, you can connect the positive supply line or the negative supply line according to [Figure 2-2](#) (2) either to pin 1 or to pin 2. Pin 3 must be connected to the ground.

Communication to LOGO! takes place via the Ethernet interface (1).

Figure 2-2: Connection of LOGO! TDE



Notes

The connection settings between LOGO! and LOGO! TDE can be found in the manual ([3](#)), Section: ([LOGO! TDE settings menu](#)).

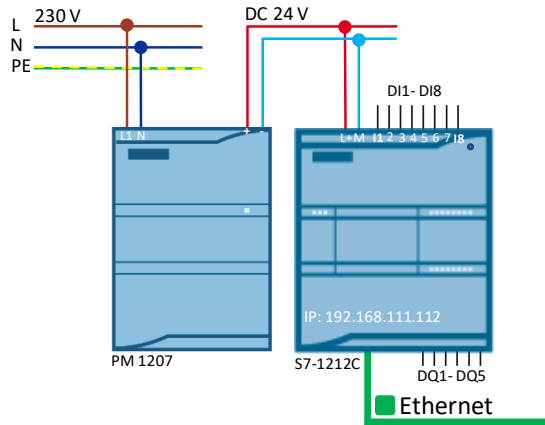
You can find information on the LOGO! web server settings here:

- [Activating the web server](#)
- [Operating the virtual base module on the web server](#)

2.2 S7-1200 Hardware Setup

[Figure 2-1](#) shows the hardware setup for the S7-1212C used here. For additional information on installation, please refer to the manuals [\[15\]](#) and [\[17\]](#).

Figure 2-3: Hardware setup for the application example



3 Commissioning

Commissioning the application example:

1. Unzip the supplied .zip file with the S7 project and the LOGO! switching program.
2. Configure and connect the hardware setup in accordance with the specifications of the application example and the respective manuals.
3. Start LOGO!Soft Comfort V8.2.
4. Open the supplied LOGO! example program *.lsc.
5. Transfer the program to the LOGO! Hardware.
6. Start TIA Portal V16.
7. Open the provided S7 project.
8. Load the project into your S7 controller.
9. Use the information in this documentation to review the communication functions.

Notes

In the application example, the IP address 192.168.111.3 has been preset for LOGO!.

You will find a description of the general procedure for assigning the IP address of a LOGO! 8 in the manual ([\3](#)), Section: ([Configuring network settings](#)).

The default S7 IP address is: 192168111112

LOGO!, S7, and your PC must be in the same subnet: 255.255.255.0

4 Communication Setup

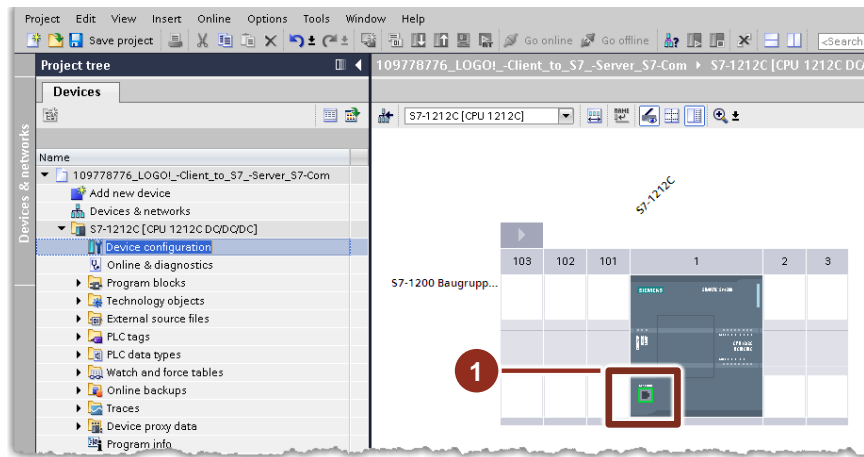
4.1 Settings in the TIA Portal (STEP 7)

4.1.1 Adding a New S7 Connection

In the first step (Figure 4-1), you will create the Device Configuration and insert your corresponding S7 from the hardware catalog.

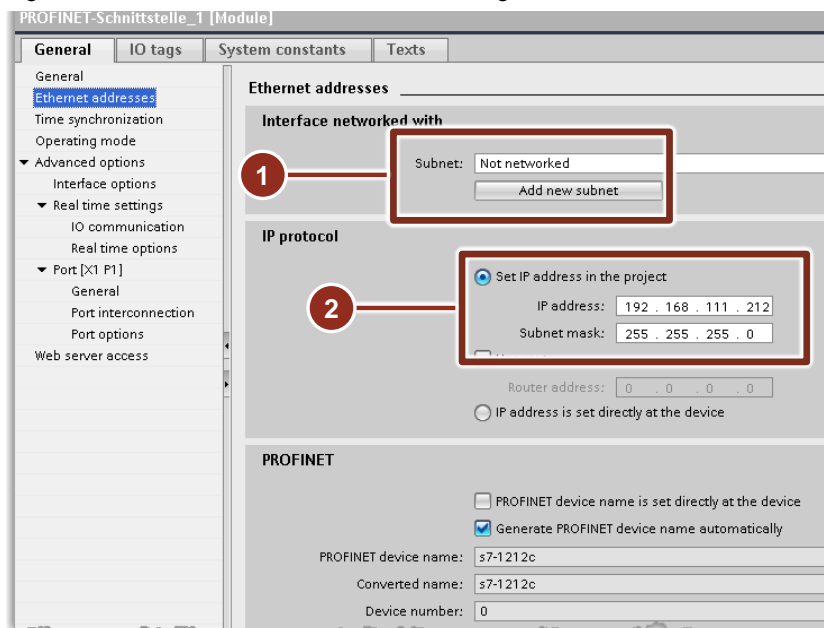
1. Double-click on the Ethernet interface (1) to access the corresponding interface properties of the CPU (Figure 4-2).

Figure 4-1: Creating the Device Configuration



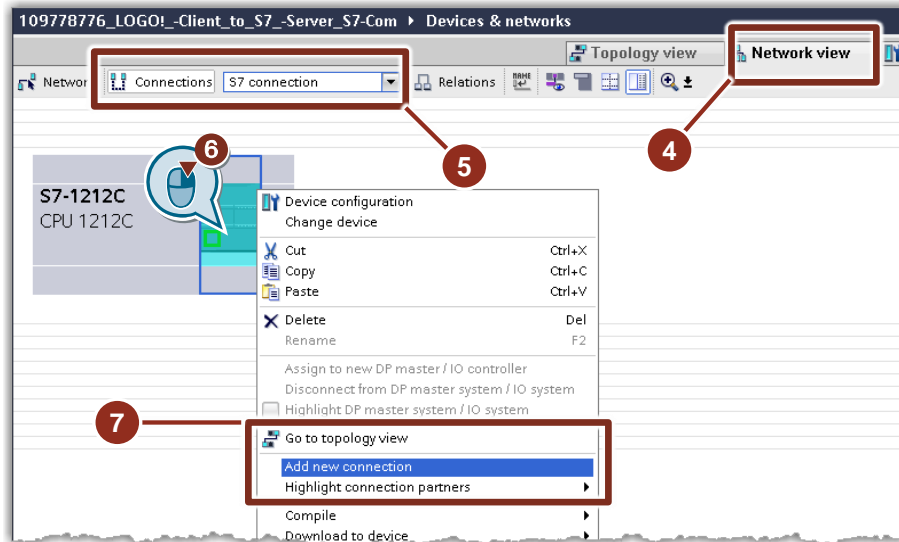
2. Select a new subnet for the connection via the Ethernet interface.
3. Assign an IP address and subnet mask for your controller (2).

Figure 4-2: IP address and subnet mask settings



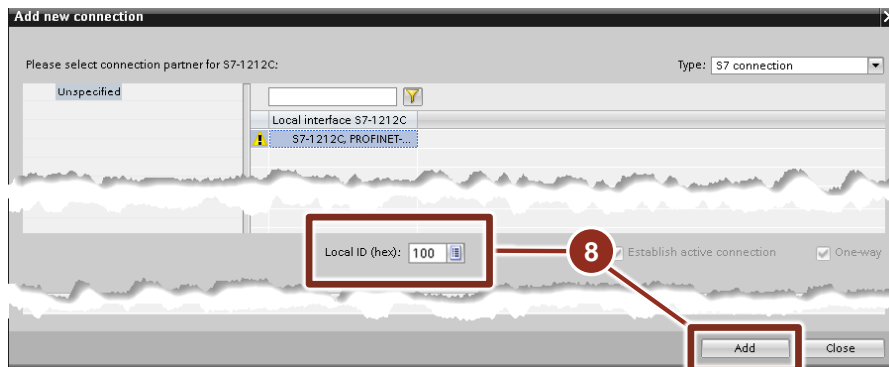
4. Add a new connection in the Network View ([Figure 4-3](#)).
5. Select "S7 connection" as the protocol.
6. By right-clicking on the module...
7. ...insert the new connection via the menu.

Figure 4-3: Add new connection – settings



8. Add the connection with the following settings. The values show the default settings ([Figure 4-4](#)).

Figure 4-4: Add new connection – Finish



Notes

You will see that the "Establish active connection" parameter is grayed out in the preselection.

This is because of the preselection of TSAP "03" as the communication partner of the S7-1200; this can be changed later in the address details as described below.

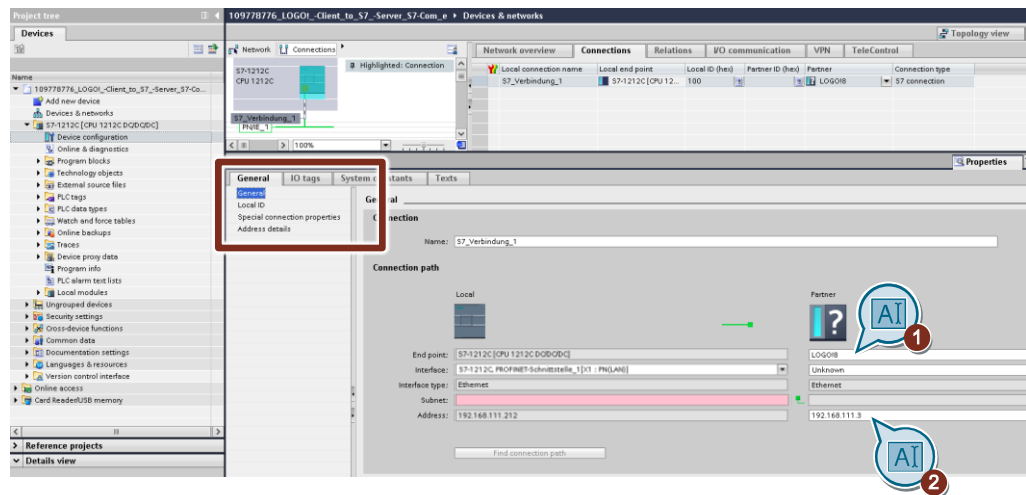
TSAP: Transport Service Access Point for transmission of addresses via I/O

4.1.2 Setting the S7 Connection for S7-1200 as a Server

Under "General" (Figure 4-5), proceed as follows:

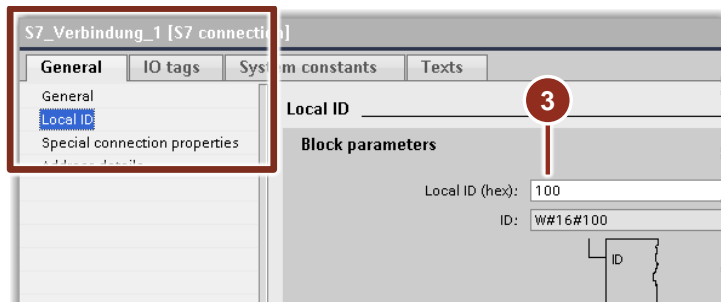
1. Name the connection partner with "LOGO!8".
2. Enter the IP address of the connection partner "192.168.111.3".

Figure 4-5: S7 connection settings – General



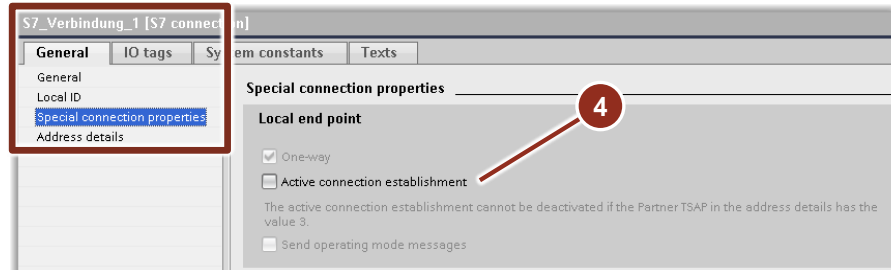
3. The local ID is used to identify a connection. Select or leave the hexadecimal value "100" here.

Figure 4-6: S7 connection settings – Local ID



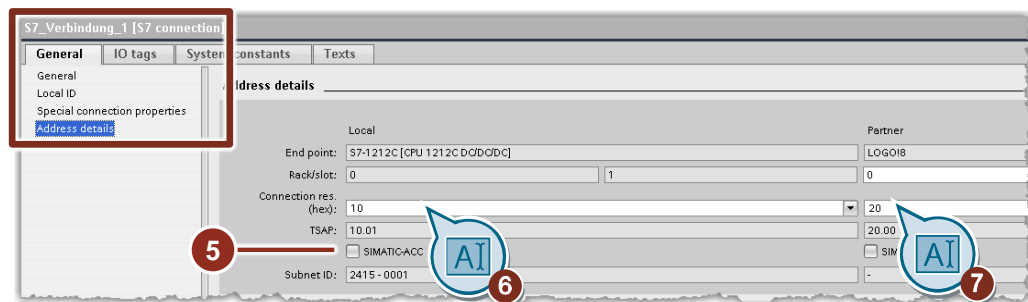
4. The "Active connection establishment" must be deactivated for this communication, but you will first receive the following information, which will bring you to step 5.
 - If the partner TSAP has a value of "3" in the address details, the active connection establishment cannot be deactivated.

Figure 4-7: S7 connection settings – Special connection properties



5. Deactivate "SIMATIC-ACC".
6. Choose hex. "10" as the connection resource for the S7-1200.
7. Enter hex. "20" for the LOGO! communication partner.

Figure 4-8: S7 connection settings – Address details



Go back to the "Special connection properties" parameters and remove the check mark for active connection establishment.

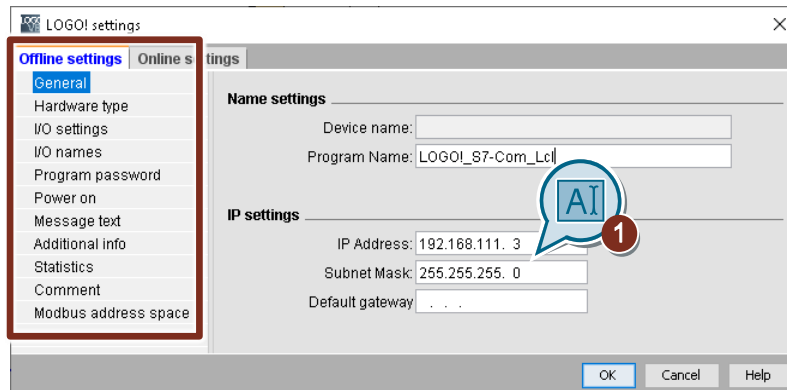
The configuration of the connection is now completed on the "TIA Portal STEP 7" pages.

4.2 Settings in LOGO!Soft Comfort

4.2.1 IP Settings for LOGO!

1. In the LOGO!Soft Comfort V8.x menu, select "File" → "Settings".
Click "General" and set the IP address and subnet mask for the LOGO! base unit.

Figure 4-9: Offline settings – General

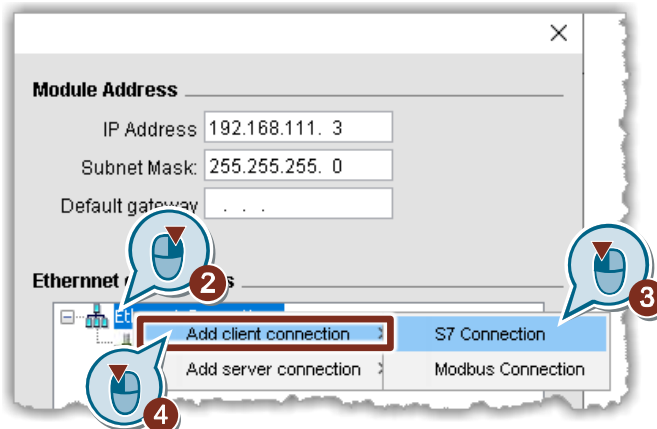


4.2.2 Setting the S7 Connection for LOGO! as Client

In the LSC menu, select "Tools" → "Ethernet connections" and create a new S7 connection, with LOGO! acting as the client.

2. Right-click Ethernet connections...
3. ...and select the client connection for LOGO!.
4. Select the S7 protocol for the connection.

Figure 4-10: Selecting the Ethernet connection – (S7 connection protocol)



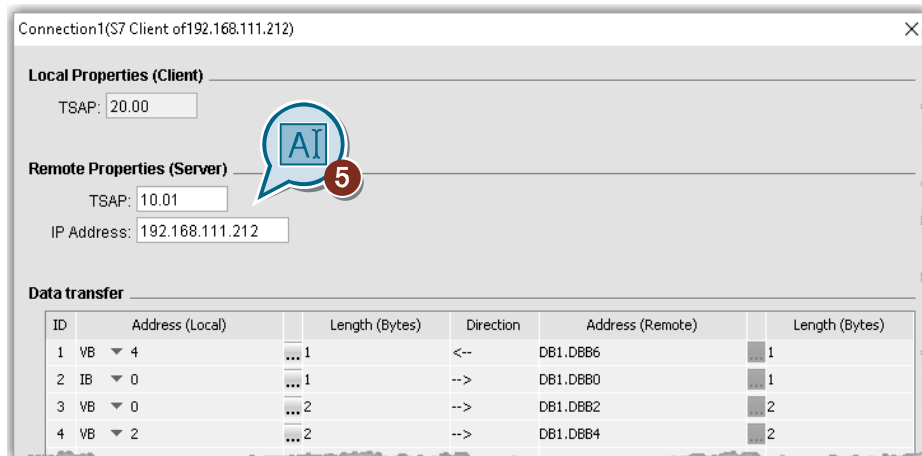
In [Figure 4-11](#), the TSAP for the client (LOGO!) is set to "20" in the local connection properties.

5. Select "10" as the TSAP for the server (S7-1200) and select the IP address of the connection partner, here the IP 192.168.111.112.

In the data transfer table, specify which data from the LOGO! base unit should be transferred to the S7.

The description can be found in [Section 5.1](#), in particular ([Figure 5-4](#)).

Figure 4-11: Local connection properties



5 Example Program

5.1 LOGO! as Client of the S7 Connection

As per the task description (Section 1), the S7 will control the digital inputs of LOGO! [I1] to [I6], as well as the analog inputs [AI1] and [AI2]. In addition, the S7 should access the digital outputs [Q1] to [Q4].

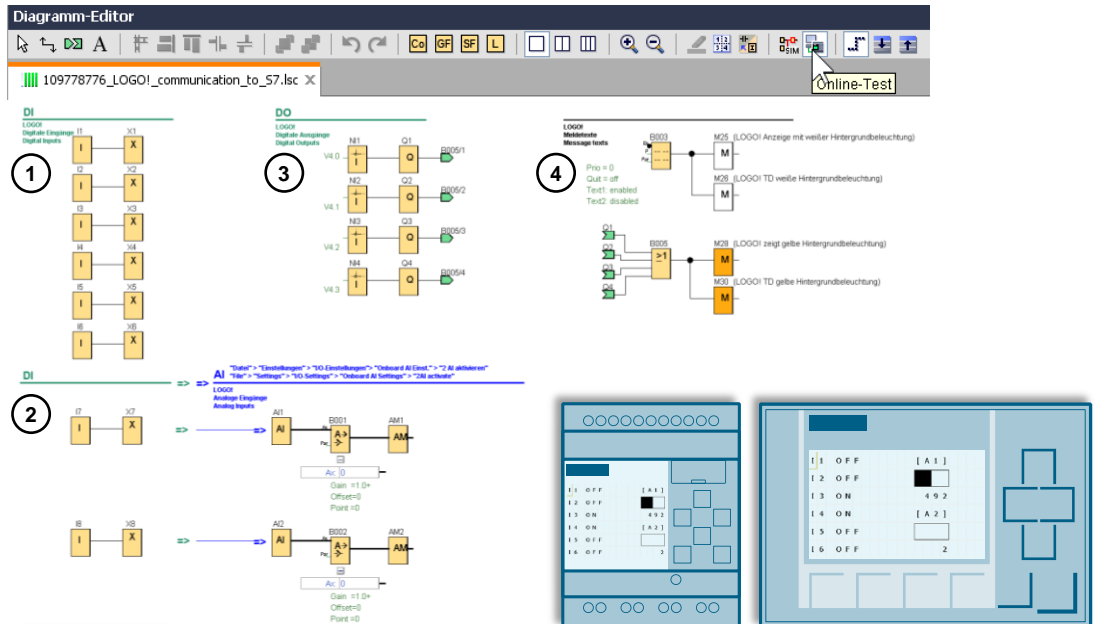
Figure 5-1 shows the LOGO! switching program for the application example with all inputs and outputs of the LOGO! base unit.

The digital inputs of LOGO! are shown at (Position 1).

The corresponding analog inputs are shown at (2). For this, the digital inputs were parameterized as analog inputs as per Table 2-3.

The digital outputs of LOGO! are shown at (3). As soon as an output is switched, the LOGO! color display switches from white to orange (4).

Figure 5-1: LOGO! switching program – Overview



Notes

The simulation function is available in LSC for illustrating the LOGO! switching program, allowing you to test individual adjustments directly.

Follow the course of the red active switching signals in the LOGO! switching program.

The online test displays the program currently running on LOGO! with the respective switching states.

5 Example Program

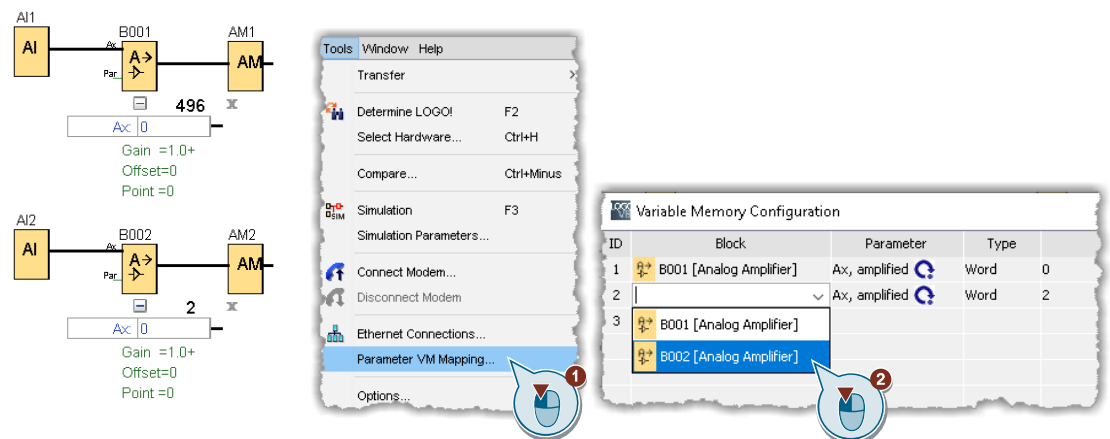
To be able to transfer the analog input values from LOGO! [Figure 5-1](#) (2) to the S7-1200, it is necessary to include them in the "Parameter VM assignment".

In the switching program (see [Figure 5-2](#)), the blocks [analog amplifier (B001)] and [analog marker (AM1)] are connected following the analog inputs.

Function blocks, such as the analog amplifier, provide various parameters within LSC, which are accessible at different locations in LSC via a drop-down menu.

1. Under "Tools", select the "Parameter VM assignment".
2. In the "Variable memory configuration" of LOGO!, select the two analog amplifiers and their parameters "Ax, amplified".
The analog value has a data volume of 2 bytes, whereby the data type is automatically recognized as Word (=2 bytes) and the address is set.

Figure 5-2: LOGO! switching program – Analog inputs in LOGO!

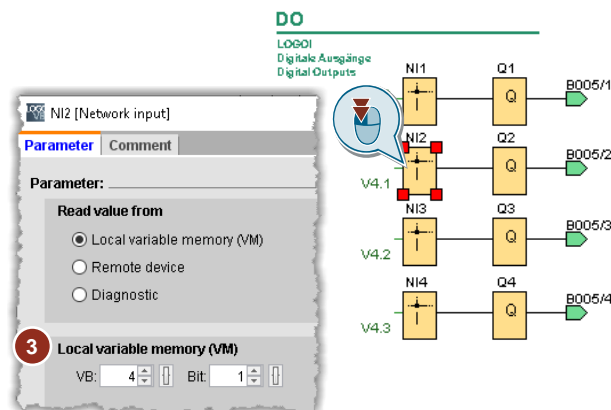


The LOGO! digital outputs should be controlled by the S7.

For this purpose, [network inputs] are inserted before the digital outputs. Double-click the corresponding block to access its properties.

3. Select the VB address 4 and enter the respective bits 0–3.

Figure 5-3: LOGO! switching program – Digital outputs in LOGO!



Then define the LOGO! client connection to the S7.

Which data should be written to the S7 and which data should be read from the S7.

For the application example, enter the values as per [Figure 5-4](#).

- Under the heading "Address (removed)", you can see the destination address, a data block [DB1] in the S7, and—under Length (bytes)—whether it is a byte or a word (=2 bytes).
- Under the "Direction" heading, you will see an "←" arrow for "Read data from S7" and an "→" arrow for "Write data to S7".
- The address contains the following address types: (VB = VariableByte; MB = MarkerByte; QB: OutputByte; IB: InputByte)

Figure 5-4: Ethernet connection for LOGO! – Definition of data transfer

ID	Address (Local)	Length (Bytes)	Direction	Address (Remote)	Length (Bytes)
1	VB 4	1	<--	DB1.DBB6	1
2	IB 0	1	-->	DB1.DBB0	1
3	VB 0	2	-->	DB1.DBB2	2
4	VB 2	2	-->	DB1.DBB4	2

ID 1 defined [VB"4"]: Address for the LOGO! outputs [Q1–Q4].

- From data block [DB1] of the S7-1200, data with a size of [1 byte] is read from DB1 [Byte"6"] and written to the [VariableByte"4"] of LOGO!.

ID 2 defined [IB"0"]: Address for the LOGO! inputs [I1–I8].

- IB 0 for [I1–I8] is written into DB1 [Byte 0] of the S7-1200.

ID 3 defined [VB"0"]: Address for the analog input [AI1]

- The analog amplifier [B001] data (2 bytes) is written from the [VariableByte"0"] of LOGO! to the DB1 [Byte "2"].

ID 4 defined [VB"2"]:

- The data (2 bytes) of the analog amplifier [B002] is written from the [VariableByte"2"] of LOGO! to the [DB1-Byte"4"].

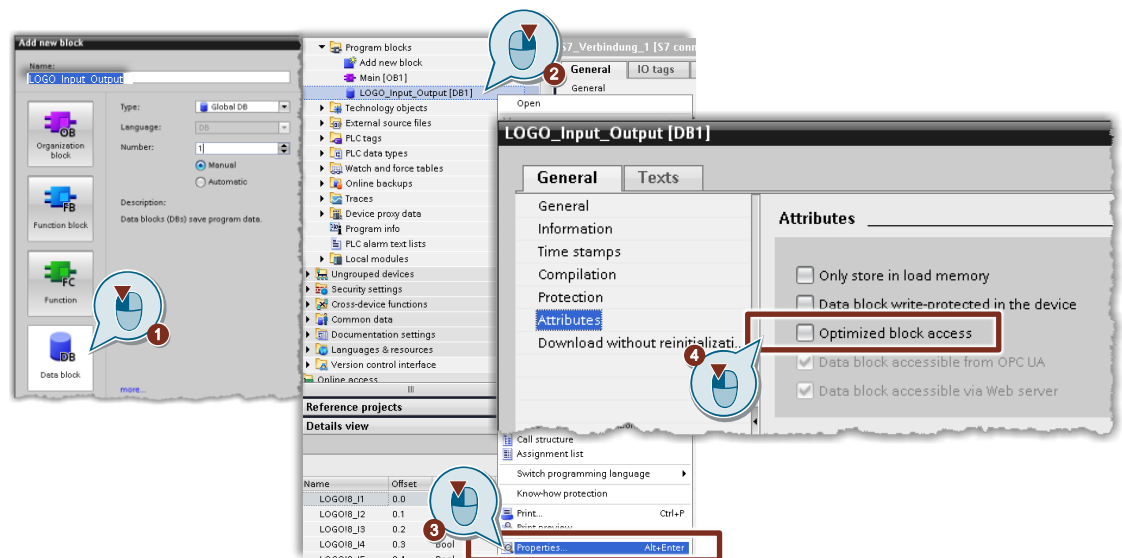
5.2 S7-1200 as a Server for the S7 Connection

As with LOGO!, with its variable memory, data communication on the S7 side also requires separate memory space for data storage and data processing. In STEP 7, the data from LOGO! is stored as variables in data block addresses. The variables of the inputs and outputs for the S7 are stored as "PLC variables" in the application example.

Communication between LOGO! and S7 requires absolute address access as described in [Figure 5-5](#).

1. Insert a new data block [DB1] as "Global DB" into the project folder "Program blocks" and rename it to "LOGO_Input_Output".
2. Right-click [DB1].
3. Open its properties.
4. Deactivate the "Optimized block access".
This ensures that the addresses are absolutely addressed and not managed or rearranged by the TIA Portal.

Figure 5-5: STEP 7 project – Include data block without optimized access



In the data block, the individual variables must be created in accordance with the data transfer table in [Figure 5-6](#). The variables for the digital inputs and outputs of LOGO! are stored as boolean variables. Analog inputs are created as variables of the type "Word". The "Offset" heading shows the absolute start addresses of the variables in [DB1].

Figure 5-6: STEP 7 project – Variables for LOGO! I/O in the data block

Name	Static	Data type	Offset	Start value	Monitor value	Retain	Accessible...	Write...	Visible in...	Setpoint
LOGO!B_I1	Bool	0.0	false	TRUE						
LOGO!B_I2	Bool	0.1	false	FALSE						
LOGO!B_I3	Bool	0.2	false	FALSE						
LOGO!B_I4	Bool	0.3	false	FALSE						
LOGO!B_I5	Bool	0.4	false	FALSE						
LOGO!B_I6	Bool	0.5	false	FALSE						
LOGO!B_AI1	Word	2.0	16#0	16#0001						
LOGO!B_AI2	Word	4.0	16#0	16#0001						
LOGO!B_Q1	Bool	6.0	false	TRUE						
LOGO!B_Q2	Bool	6.1	false	FALSE						
LOGO!B_Q3	Bool	6.2	false	FALSE						
LOGO!B_Q4	Bool	6.3	false	FALSE						

5.3 STEP 7 – Example Program with Selected Data

For corresponding access to LOGO! and S7, the respective variables (Bit) or (Word) must be set in the data block or the variable table. The variable table shows the inputs and outputs of the S7.

In the example program in [Figure 5-7](#), two functions are executed in one of the two networks. The states of the inputs and outputs from the LOGO! switching program are included in the Figure.

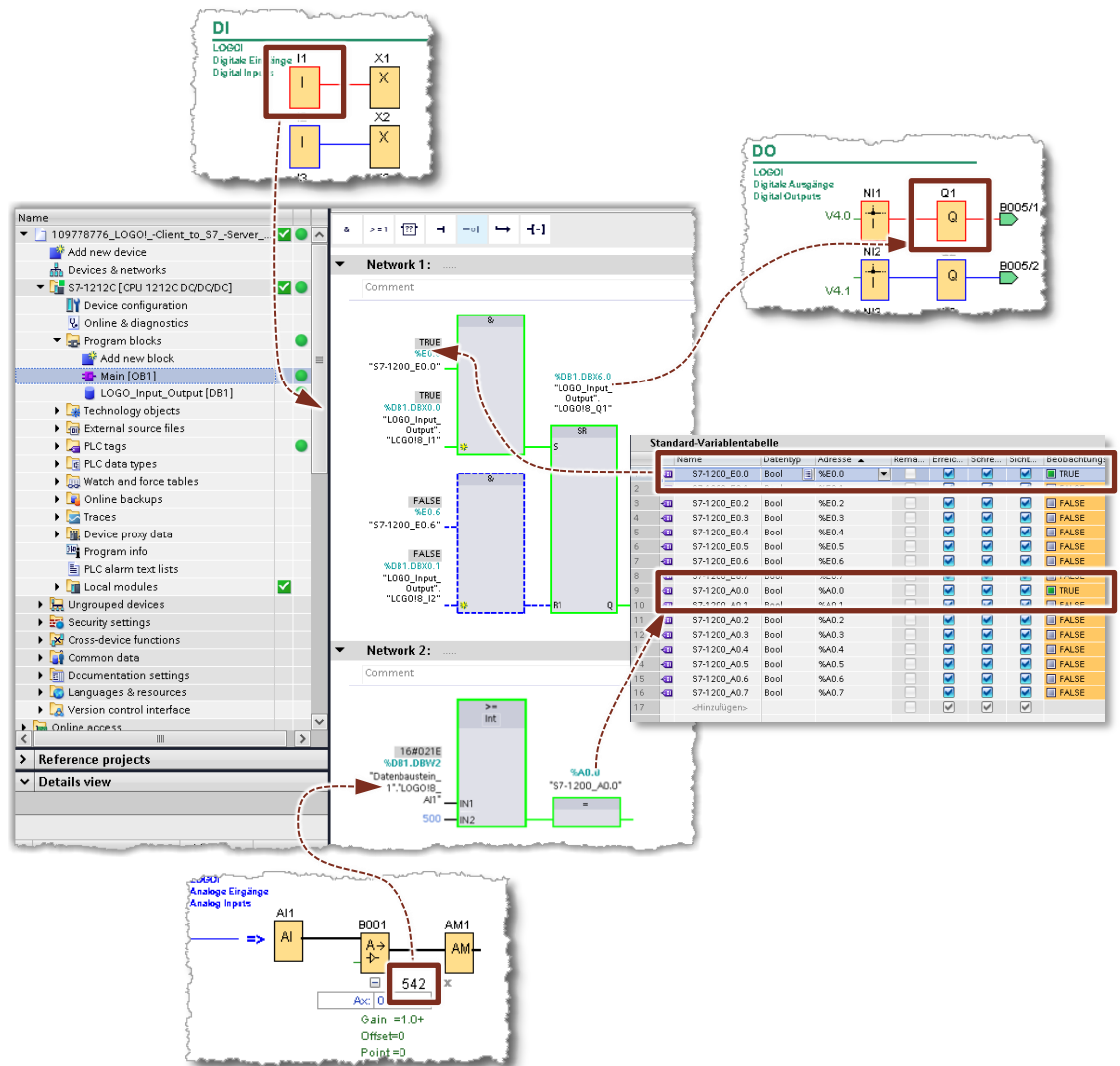
Network (1)

- If a 1 signal is present at the input of S7 [E0.0] and at input [I1] of LOGO!, output [Q1] of LOGO! is set.
- If a 1 signal is present at the input of S7 [E0.7] and at input [I2] of LOGO!, output [Q1] of LOGO! is reset.

Network (2)

- The S7-1200 output of S7 [Q0.0] is triggered if the value of the analog input [AI1] of LOGO! is greater than or equal to 500 (AI1 >= 5V).

Figure 5-7: STEP 7 project – Example program



6 LOGO! Server and S7 Client

This communication is not part of this application example

Establishing communication with LOGO! as a server and a SIMATIC S7 as a client is much more complex and will probably be discussed in a future application example, as of the creation of this document. At this point, however, we would like to give you some basic information on this approach.

LOGO! switching program

The LOGO! switching program is configured as a LOGO! network project.

In the network project, integrate your computer, the LOGO! base unit, and an S7-compatible device with the corresponding IP settings. Create a graphical S7 connection with LOGO! as a server.

Digital input from LOGO!

In the LOGO! switching program, you can configure a digital input [I1] on a network output [NQ block] and write "VB address [0] to bit [0]" and, for example, [I6] "VB address [0] to bit [5]" to its parameter, "Local VM".

This boolean value of [I1] is recorded on the S7-side in an input area of a data block, e.g. "DB1.DBX0.0" (by means of an S7 GET command).

DB1 is set by default for LOGO! and has an input and output area.

Digital output/input from LOGO!

You can read the data of a transmission data block from the client via a network input [NI1], e.g., "DB1.DBX2.0" (using the S7 PUT command).

S7 project

In the S7 project, include the blocks of the S7 "GET" and "PUT" commands from the command list.

The S7 is responsible for the active connection establishment. For this purpose, the respective box must be checked under S7 Connection > "General" > "Special connection settings", assuming the IP settings and address details are available.

You can find additional information on the use of these blocks in the application examples, manuals, and FAQs in the Industry Online Support by using the keywords "PUT, GET, S7 communication"

For now, we would like to refer you to examples with S7-200 and S7-300 and the older LOGO! 0BA7 generation; see article [9](#).

7 Appendix

7.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

<https://support.industry.siemens.com>

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:

www.siemens.com/industry/supportrequest

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For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

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7.2 Links and Literature

Table 7-1: Links and Literature

No.	Subject
\1\	Siemens Industry Online Support - https://support.industry.siemens.com
\2\	This entry - https://support.industry.siemens.com/cs/ww/en/view/109778776
\3\	LOGO! 8 user manual - https://support.industry.siemens.com/cs/ww/en/view/109741041
\4\	LOGO! logic module (Application examples, expansion modules) - www.siemens.de/logo
\5\	SIMATIC S7 S7-1200 Programmable Controller - https://support.industry.siemens.com/cs/ww/en/view/109759862
\6\	SIMATIC STEP 7 Basic/Professional V16 and SIMATIC WinCC V16 - https://support.industry.siemens.com/cs/ww/en/view/109773506
\7\	POWER SUPPLY S7-1200 PM1207 - https://support.industry.siemens.com/cs/ww/en/view/37316256
\8\	Programming Guide for S7-1200/S7-1500 - https://support.industry.siemens.com/cs/ww/en/view/90885040
\9\	How do you establish an S7 connection (server/client) between a LOGO! 0BA7 and an S7-300 CPU? - https://support.industry.siemens.com/cs/ww/en/view/87604984

7.3 Change documentation

Table 7-2: Change documentation

Version	Date	Change
V1.0	07/2020	First version