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Communication blocks and faceplates for the SITOP SEL1200 / 1400

SITOP SEL1200 / SEL1400
SIMATIC STEP 7 Basic / Professional V17
SIMATIC WinCC Unified V17

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Table of contents

1 Introduction

1.1 Overview

The "LSEL_V17.0-0_V1_0_0" library provides function blocks and faceplates for the SITOP SEL1200 and SEL1400. You can use the function blocks to read the device data from the selectivity module. You can use the faceplates to clearly display the device data on an HMI operator device.

The prefabricated modules save you time and money in engineering. You also do not have to worry about the serial communication of the SITOP SEL1200 and SEL1400 with your controller.

1.2 Principle of operation

The "COM" diagnostic interface of the SEL1200 and SEL1400 provides a signal that transmits the following device data as a Manchester code.

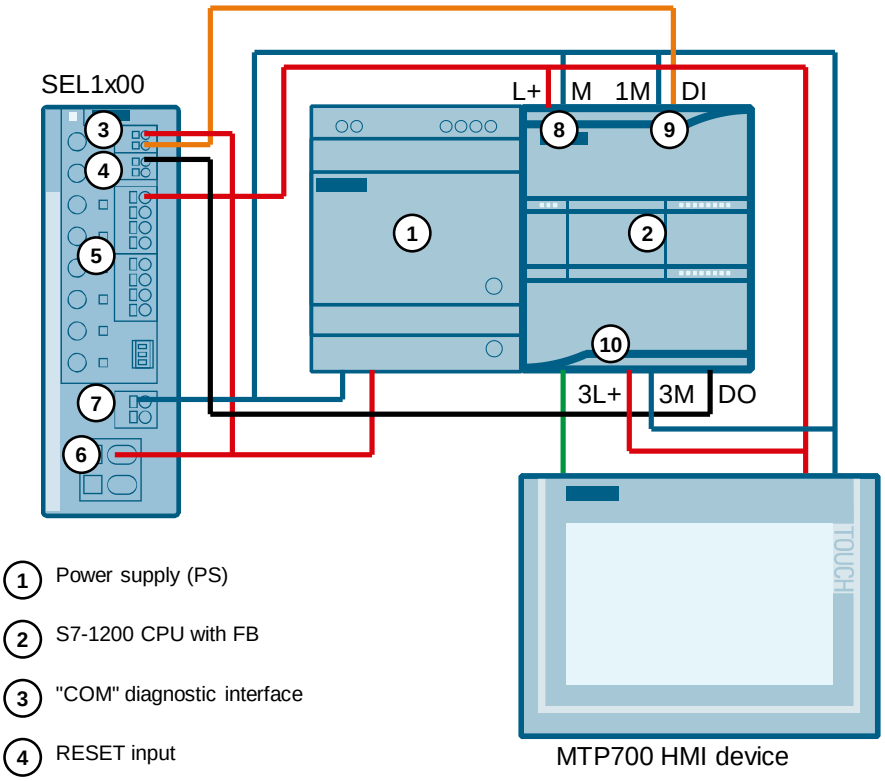
- Status information of the outputs
- Current output current values at the outputs
- Current limit values of the outputs
- Device information

The signal of the diagnostics interface "COM" is read and evaluated by the S7 CPU via a digital input. The aforementioned device data is stored in the S7 CPU in a pre-defined data structure (PLC data type). The HMI device accesses this predefined data structure to display the device data.

1.2.1 Application with S7-1200

The following Figure shows the connection of the SEL1200 and SEL1400 to a digital input of the S7-1200 CPU.

Figure 1-1



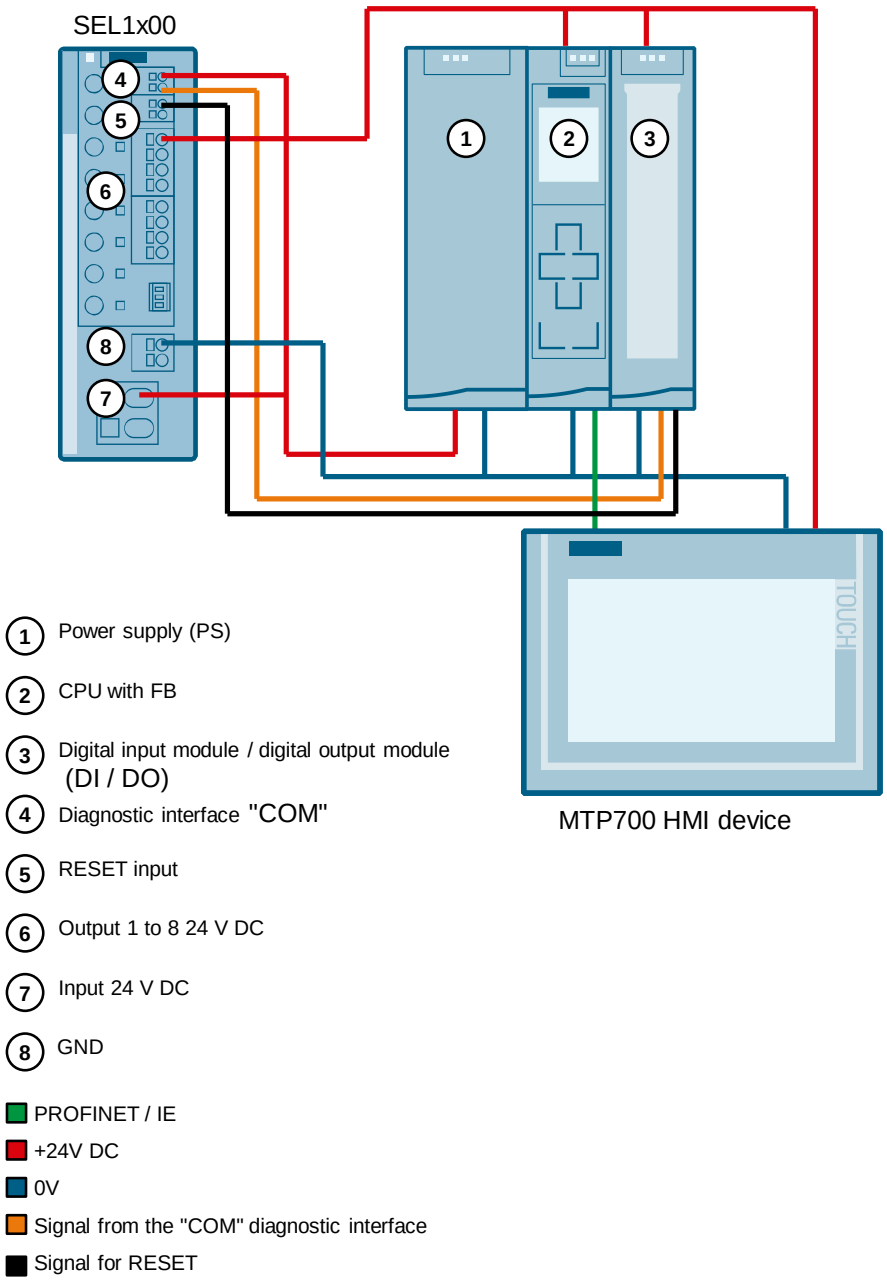
1. Power supply (PS)
2. S7-1200 CPU with FB
3. "COM" diagnostic interface
4. RESET input
5. Output 1 to 8 24 V DC
6. Input 24 V DC
7. GND
8. X10 (24VDC)
9. X11 (24VDC INPUTS)
10. X12 (24VDC OUTPUTS)

- PROFINET / IE
- +24V DC
- 0V
- Signal from the "COM" diagnostic interface
- Signal for RESET

1.2.2 Application with S7-1500

The following Figure shows the connection of the SEL1200 and SEL1400 to a digital input module of the S7-1500.

Figure 1-2



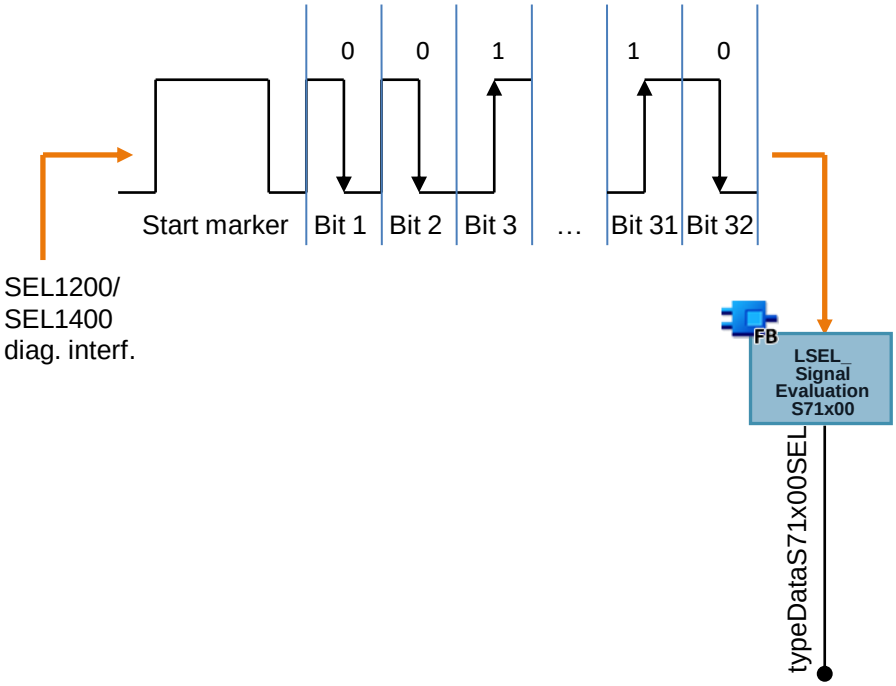
1.2.3 Method of action

The library provides the function block (FB) for each of the following CPUs:

- S7-1500 CPUs
- S7-1200 CPUs

Call up the S7-CPU in the FB user program to evaluate the signal from the "COM" diagnostic interface. The FB reads the "COM" diagnostic interface signal via a digital input. Status information, current values and current limit values of the outputs as well as device information are stored in a predefined data structure (PLC data type) at its output.

Figure 1-3



1.2.4 Signal profile

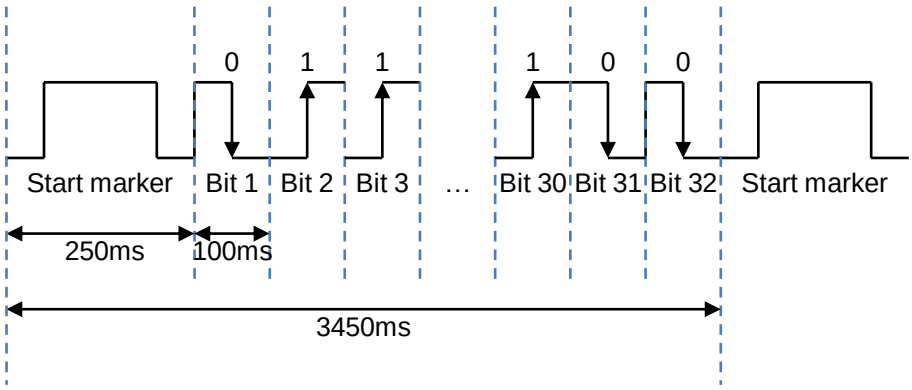
Figure 1-4 shows the signal profile. A signal telegram consists of a start character and 32 bits.

Start character is structured as follows:

- 50 ms low level
- 150 ms high level
- 50 ms low level

The individual bits are transferred as a Manchester code. A bit has a duration of 100 ms, whereby the high level and the low level are each 50 ms long. A "0" is represented by a falling edge, i.e. a "0" is represented by a high level followed by a low level. A "1" is represented by a rising edge, i.e. a "1" is represented by a low level followed by a high level.

Figure 1-4

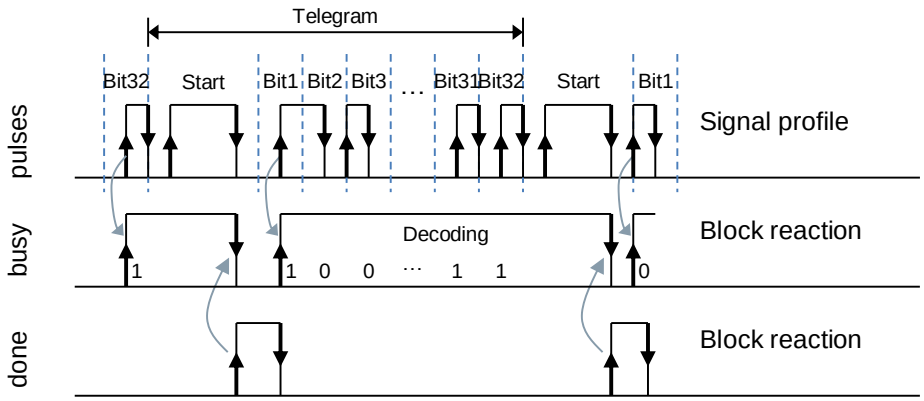


1.2.5 Effective reaction of the function block

Figure 1-5 graphically depicts the functional reaction of the following function blocks:

- FB "LSEL_SignalEvaluationS71500"
- FB "LSEL_SignalEvaluationS71200"

Figure 1-5



Note

The instance DB of the FB "LSEL_SignalEvaluationS71200" and FB "LSEL_SignalEvaluationS71500" is generated when the function block is called. You need a separate instance DB for each call of the function block.

1.2.6 Internally used instructions for S7-1200 CPUs

For the S7-1200 CPUs, the following instructions are used internally in the function block:

- RD_SYS_T: The instruction RD_SYS_T reads the current date and time (module time) from the CPU. The time is used in the function block to calculate the cycle time and find the length of the high and low levels.
  The RD_SYS_T instruction can be found in the "Instructions" task card under "Extended instructions > Date and time-of-day".
- TON: The instruction generates a switch-on delay. The switch-on delay is used in the function block when generating error messages.
  The TON instruction can be found in the Task Card "Instructions" under "Basic instructions > Timer operations".
- T_DIFF: The instruction calculates the difference between two time points by subtracting two DT format time points.
  The T_DIFF instruction can be found in the "Instructions" task card under "Extended instructions > Date and time-of-day".

Compare time values

To calculate the cycle time and the length of the high and low levels, the time read must be greater than the time read and stored in the last cycle, i.e. comparison expressions are used in the FB to compare the contents of two variables of data type "DTL" to greater.

Calculate cycle time

To calculate the cycle time, the read time is stored in each cycle and subtracted from the newly read time in the next cycle. The cycle time must not exceed 10 ms so that every high level in the signal path of the "COM" diagnostic interface can be detected. If the cycle time exceeds 10 ms, the function block outputs an error with the value 16#8001 at the output "status".

Calculate the length of a pulse

To calculate the length of a high level, the time is read and stored if a positive edge is detected at the "impulse" input. If a negative edge is subsequently detected, the time is read again and stored. The time stored on a positive edge is subtracted from the time stored on a negative edge.

Calculate the length of a pause

To calculate the length of a low level, the time is read and stored if a negative edge is detected at the "impulse" input. If a positive edge is subsequently detected, the time is read again and stored. The time stored on a negative edge is subtracted from the time stored on a positive edge.

Note Since the time is used in the S7-1200 to calculate the cycle time and the length of the high level and low level, the output "dataSel" must not be evaluated if the time is set by time synchronization.

1.2.7 Internally used instructions for S7-1500

The following instructions are used internally in the function block for the S7-1500 CPUs.

- TIME_TCK: The instruction TIME_TCK reads the system time of the CPU. The system time is a time counter that counts from 0 to a maximum of 2147483647 ms. In the event of an overflow, counting starts again from "0". The time grid and the accuracy of the system time is 1 ms. In the function block, the system time is used to calculate the cycle time and to determine the length of the high and low levels.
  The TIME_TCK instruction is found in the "Instructions" task card under "Extended instructions > Date and time-of-day > Clock functions".
- TON: The instruction generates a switch-on delay. The switch-on delay is used in the function block when generating error messages.
  The TON instruction can be found in the task card "Instructions" under "Basic instructions > Timer operations".

Compare time values

To calculate the cycle time and the length of the high and low levels, the system time read must be greater than the system time read and stored in the last cycle, i.e. comparison expressions are used in the FB to compare the contents of two variables of data type "TIME".

Calculate cycle time

To calculate the cycle time, the read system time is stored in each cycle and subtracted from the newly read system time in the next cycle. The cycle time must not exceed 10 ms so that every high level in the signal path of the "COM" diagnostic interface can be detected. If the cycle time exceeds 10 ms, the function block outputs an error with the value 16#8001 at the output "status".

Calculate the length of a high level

To calculate the length of a high level, the system time is read and stored if a positive edge is detected at the "impulse" input. If a negative edge is subsequently detected, the system time is read and stored again. The system time stored on a positive edge is subtracted from the system time stored on a negative edge.

Calculating the length of a low level

To calculate the length of a low level, the system time is read and stored if a negative edge is detected at the "impulse" input. If a positive edge is subsequently detected, the system time is read and stored again. The system time stored at a negative edge is subtracted from the system time stored at a positive edge.

1.2.8 Content of the telegrams of the SEL1200 and SEL1400

Overview

The SEL1200 and SEL1400 send 4 telegrams with the following content via the diagnostic interface:

- Bit 1 to 6: Header
- Bit 7 to 32: telegram-dependent payload

The header and the status information from the SEL1200 and SEL1400 are contained in all 4 telegrams. The following payloads are transmitted with the 4 telegrams:

- Status information of the outputs
- Current output current values at the outputs
- Current limit values of the outputs
- Device information

The following Figure shows the structure of the telegrams.

Figure 1-6

Bit	1	2	3	4	5	6	7 to 32
	Header						telegram-dependent payload
	Device type[1)]			R[2)]	Content type		
Telegram 1	0	x	x	0	0	0	Status information, output 1 to 8
Telegram 2	0	x	x	0	0	1	Device information
Telegram 3	0	x	x	0	1	0	Current values (output current values of current limit values), output 1 to 4
Telegram 4	0	x	x	0	1	1	Current values (output current values of current limit values), output 5 to 8

[1)] Device type: SEL1200 or SEL1400
[2)] R: Reserved

The following Table shows the contents of the device type.

Table 1-1

Bit	Meaning	Value range (binary)
1 to 3	Device type	$001_{bin} = 1_{dez}$: SEL1200 $010_{bin} = 2_{dez}$: SEL1400

Useful content of telegram 1

In telegram 1 status information of outputs 1 to 8 are transmitted. This telegram is identified in the header by the content type $00_{bin} = 0_{dez.}$

The following Table shows the payload of telegram 1.

Table 1-2

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-6 and Table 1-1
7	Input voltage	0: Input voltage too low or too high 1: Input voltage in permissible range

Bit	Meaning	Value range (binary)
8 to 10	Status of output 1	See Table 1-3
11 to 13	Status of output 2	See Table 1-3
14 to 16	Status of output 3	See Table 1-3
17 to 19	Status of output 4	See Table 1-3
20 to 22	Status of output 5	See Table 1-3
23 to 25	Status of output 6	See Table 1-3
26 to 28	Status of output 7	See Table 1-3
29 to 31	Status of output 8	See Table 1-3
32	Parity	The parity bit serves as a supplementary bit to supplement the number of bits occupied by 1 (including the parity bit) in the telegram as even or odd. 0: Parity sum even 1: Parity sum uneven

The following Table shows and describes the value range (binary) of the status information of outputs 1 to 8.

Table 1-3

Value range (binary)	Description	LED of the output
$000_{bin} = 0_{dez}$	Automatically switched off, reset not possible ("Automatically switched off, reset not possible")	Illuminated red
$001_{bin} = 1_{dez}$	Automatically switched off, reset possible	Flashes red
$010_{bin} = 2_{dez}$	Manually switched off	Flashes orange
$011_{bin} = 3_{dez}$	Switched on	Illuminated green
$100_{bin} = 4_{dez}$:	Broken	LED Off
$101_{bin} = 5_{dez}$:	Device overtemperature, output switched off ("Device overtemperature, output switched off")	red
$110_{bin} = 6_{dez}$:	I_{SUM} too high ("I_{SUM} too high")	red
$111_{bin} = 7_{dez}$:	$I_{OUT} > I_{SET}$	Flashes green

Useful content of telegram 2

In telegram 2 device information is transmitted. This telegram is identified in the header by the content type $01_{bin} = 1_{dez.}$

Table 1-4

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-6 and Table 1-1
7 to 10	Month of construction	$0000_{bin} = 0_{dez}$: Reserve $0001_{bin} = 1_{dez}$: January $0010_{bin} = 2_{dez}$: February $0011_{bin} = 3_{dez}$: March $0100_{bin} = 4_{dez}$: April $0101_{bin} = 5_{dez}$: May $0110_{bin} = 6_{dez}$: June $0111_{bin} = 7_{dez}$: July $1000_{bin} = 8_{dez}$: August $1001_{bin} = 9_{dez}$: September $1010_{bin} = 10_{dez}$: October $1011_{bin} = 11_{dez}$: November $1100_{bin} = 12_{dez}$: December $1101_{bin} = 13_{dez}$: Reserve $1110_{bin} = 14_{dez}$: Reserve $1111_{bin} = 15_{dez}$: Reserve
11 to 13	Software version	0 to 7
14 to 16	Device version: Digit 11 of the article number	0 to 7
17 to 19	Device innovations Digit 12 of the article number	0 to 7
20 to 22	Variants (Number of channels) Digit 14 of the article number	$000_{bin} = 0_{dez}$: A (one channel) $001_{bin} = 1_{dez}$: B (two channels) $010_{bin} = 2_{dez}$: C (four channels) $011_{bin} = 3_{dez}$: D (eight channels) $100_{bin} = 4_{dez}$: X (Not relevant) $101_{bin} = 5_{dez}$: Reserve $110_{bin} = 6_{dez}$: Reserve $111_{bin} = 7_{dez}$: Reserve
23 to 26	Year of manufacture	0 to 15 years from 2019
27 to 29	Product version	0 to 7
30	Coating	0: Circuit boards not coated 1: Circuit boards coated
31	Manufacturer site	0: Manufacturer site Vienna 1: Manufacturer site Sibiu
32	Parity	The parity bit serves as a supplementary bit to supplement the number of bits occupied by 1 (including the parity bit) in the telegram as even or odd. 0: Parity sum even 1: Parity sum uneven

Useful content of telegram 3

In telegram 3, the current values (measured values of the output currents and current limit values) of outputs 1 to 4 are transmitted. This telegram is identified in the header by the content type 10bin = 2dez.

Bits 7 and 8 indicate whether 3 measured values of the output currents or current limit values are transmitted in the telegram. If bits 7 and 8 have the value $00_{bin} = 0_{dez}$, then the measured values of the output currents will be transmitted.

Table 1-5

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-6 and Table 1-1
7 to 8	Measured value / current limit value	**$00_{bin} = 0_{dez}$: Telegram contains measured values** $10_{bin} = 2_{dez}$: Telegram contains current limit values
9 to 12	Output 1: current output current	0% to 150% of rated current
13 to 16	Output 2: current output current	0% to 150% of rated current
17 to 20	Output 3: current output current	0% to 150% of rated current
21 to 24	Output 4: current output current	0% to 150% of rated current
25 to 26	Reserved	0
27 to 28	boot sequence	$00_{bin} = 0_{dez}$: Load-dependent ramp-up $01_{bin} = 1_{dez}$: Time delay acceleration 25 ms $10_{bin} = 2_{dez}$: Time delay acceleration 200 ms $11_{bin} = 3_{dez}$: Time delay ramp-up 500 ms
29 to 30	Nominal current Channels	$00_{bin} = 0_{dez}$: 3 A $01_{bin} = 1_{dez}$: 5 A $10_{bin} = 2_{dez}$: 10 A $11_{bin} = 3_{dez}$: reserved
31	Number of outputs	0: 4 Outputs 1: 8 Outputs
32	Parity	The parity bit serves as a supplementary bit to supplement the number of bits occupied by 1 (including the parity bit) in the telegram as even or odd. 0: Parity sum even 1: Parity sum uneven

If bits 7 and 8 have the value $10_{bin} = 2_{dez}$, then the current limit value set at the potentiometer will be transmitted.

Table 1-6

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-6 and Table 1-1
7 to 8	Measured value / current limit value	$00_{bin} = 0_{dez}$: Telegram contains measured values **$10_{bin} = 2_{dez}$: Telegram contains current limit values**
9 to 12	Output 1: Current limit value / cause of switch-off	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
13 to 16	Output 2: current limit value	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
17 to 20	Output 3: current limit value	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
21 to 24	Output 4: current limit value	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
25 to 26	Reserved	0
27 to 28	boot sequence	$00_{bin} = 0_{dez}$: Load-dependent ramp-up $01_{bin} = 1_{dez}$: Time delay acceleration 25 ms $10_{bin} = 2_{dez}$: Time delay acceleration 200 ms $11_{bin} = 3_{dez}$: Time delay ramp-up 500 ms
29 to 30	Nominal current Channels	$00_{bin} = 0_{dez}$: 3 A $01_{bin} = 1_{dez}$: 5 A $10_{bin} = 2_{dez}$: 10 A $11_{bin} = 3_{dez}$: reserved
31	Number of outputs	0: 4 Outputs 1: 8 Outputs
32	Parity	The parity bit serves as a supplementary bit to supplement the number of bits occupied by 1 (including the parity bit) in the telegram as even or odd. 0: Parity sum even 1: Parity sum uneven

The following Table shows an overview of the causes of shutdown.

Table 1-7

Value range (binary)	Description
$0000_{bin} = 0_{dez}$:	-
$0001_{bin} = 1_{dez}$:	$I_{OUT} > I_{SET}$
$0010_{bin} = 2_{dez}$:	$I_{OUT} > 1{,}5x\ I_{SET}$
$0011_{bin} = 3_{dez}$:	$I_{SUM} > 60$ A
$0100_{bin} = 4_{dez}$:	$U_{IN} < 19.4$ V und $I_{OUT} > I_{SET}$
$0101_{bin} = 5_{dez}$:	$U_{IN} < 19.4$ V
$0110_{bin} = 6_{dez}$:	$U_{IN} < 15$ V
$0111_{bin} = 7_{dez}$:	$U_{IN} > 30$ V
$1000_{bin} = 8_{dez}$:	device overtemperature ("Device overtemperature")
$1001_{bin} = 9_{dez}$:	Reserve
$1010_{bin} = 10_{dez}$:	Reserve
$1011_{bin} = 11_{dez}$:	Reserve
$1100_{bin} = 12_{dez}$:	Reserve
$1101_{bin} = 13_{dez}$:	Reserve
$1110_{bin} = 14_{dez}$:	Reserve
$1111_{bin} = 15_{dez}$:	Reserve

Useful content of telegram 4

In telegram 4, the current values (measured values of the output currents and current limit values) of outputs 5 to 8 are transmitted. This telegram is identified in the header by the content type $11_{bin} = 3_{dez}$

Bits 7 and 8 indicate whether 4 measured values of the output currents or current limit values are transmitted in the telegram. If bits 7 and 8 have the value $00_{bin} = 0_{dez}$, then the measured values of the output currents will be transmitted.

Table 1-8

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-6 and Table 1-1
7 to 8	Measured value / current limit value	**$00_{bin} = 0_{dez}$: Telegram contains measured values** $10_{bin} = 2_{dez}$: Telegram contains current limit values
9 to 12	Output 5: current output current	0% to 150% of rated current
13 to 16	Output 6: current output current	0% to 150% of rated current
17 to 20	Output 7: current output current	0% to 150% of rated current
21 to 24	Output 8: current output current	0% to 150% of rated current
25 to 26	Reserved	0
27 to 28	boot sequence	$00_{bin} = 0_{dez}$: Load-dependent ramp-up $01_{bin} = 1_{dez}$: Time delay acceleration 25 ms $10_{bin} = 2_{dez}$: Time delay acceleration 200 ms $11_{bin} = 3_{dez}$: Time delay ramp-up 500 ms
29 to 30	Nominal current Channels	$00_{bin} = 0_{dez}$: 3 A $01_{bin} = 1_{dez}$: 5 A $10_{bin} = 2_{dez}$: 10 A $11_{bin} = 3_{dez}$: reserved
31	Number of outputs	0: 4 Outputs 1: 8 Outputs
32	Parity	The parity bit serves as a supplementary bit to supplement the number of bits occupied by 1 (including the parity bit) in the telegram as even or odd. 0: Parity sum even 1: Parity sum uneven

If bits 7 and 8 have the value $10_{bin} = 2_{dez}$, then the current limit value set at the potentiometer will be transmitted.

Table 1-9

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-6 and Table 1-1
7 to 8	Measured value / current limit value	$00_{bin} = 0_{dez}$: Telegram contains measured values **$10_{bin} = 2_{dez}$: Telegram contains current limit values**
9 to 12	Output 5: Current limit value / cause of switch-off	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
13 to 16	Output 6: current limit value	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
17 to 20	Output 7: current limit value	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
21 to 24	Output 8: current limit value	• 0% to 100% of rated current • If the output is switched off automatically, the cause of the switch-off is transmitted instead of the current limit value (see Table 1-7).
25 to 26	Reserved	0
27 to 28	boot sequence	$00_{bin} = 0_{dez}$: Load-dependent ramp-up $01_{bin} = 1_{dez}$: Time delay acceleration 25 ms $10_{bin} = 2_{dez}$: Time delay acceleration 200 ms $11_{bin} = 3_{dez}$: Time delay ramp-up 500 ms
29 to 30	Nominal current Channels	$00_{bin} = 0_{dez}$: 3 A $01_{bin} = 1_{dez}$: 5 A $10_{bin} = 2_{dez}$: 10 A $11_{bin} = 3_{dez}$: reserved
31	Number of outputs	0: 4 Outputs 1: 8 Outputs
32	Parity	The parity bit serves as a supplementary bit to supplement the number of bits occupied by 1 (including the parity bit) in the telegram as even or odd. 0: Parity sum even 1: Parity sum uneven

1.3 Components used

This application example was created with the following hardware and software components.

Table 1-10

Component	Quantity	Item number	Alternative
S7-1200			
CPU 1211C	1	6ES7211-1AE40-0XB0	Any S7-1200 CPU
S7-1500			
CPU 1513-1 PN	1	6ES7513-1AL01-0AB0	Any S7-1500 CPU, ET 200SP CPU and ET 200pro CPU
Digital input module DI 32x24V DC HF	1	6ES7-1BL00-0AB0	Other digital input modules or digital inputs for a distributed I/O system
HMI operator panel			
MTP700 Comfort	1	6AV2128-3GB06-0AX0	All Unified Comfort Panels ≥ 7" and PC stations with SIMATIC WinCC Unified PC RT ≥ V17 are also usable
Engineering software			
STEP 7 V17	1	6ES7822-1AA07-0YA5	For the configuration of the S7 CPU you will need STEP 7 Professional V17 or higher.
WinCC Advanced / Unified PC V17	1	6AV2102-0AA07-0AA5	To configure SIMATIC panels, WinCC WinCC Unified PC RT. Download license also possible
SIMATIC WinCC Runtime Advanced 4096 PowerTags V17	1	6AV2104-0HA07-0AA0	Package V17 Download license also possible

2 Engineering

2.1 Interface description

2.1.1 PLC data type for S7-1200 and S7-1500

The following PLC data types are predefined data structures that store the payloads of the telegrams:

- "typeDataS71200SEL"
- "typeDataS71500SEL"

The following Table shows the structure of the PLC data types.

Table 2-1

Parameters	Data type	Start value	Description
deviceName	String	SEL1200	Device name
stateCOM	Bool	TRUE	DIP switch "COM" status TRUE: Diagnostic interface "COM" activated FALSE: Diagnostic interface "COM" deactivated
stateDipSwitchTD1	Bool	FALSE	DIP switch "TD1" status FALSE: TD1 off (position left) TRUE: TD1 on (right position)
stateDipSwitchTD2	Bool	FALSE	DIP switch "TD2" status FALSE: TD2 off (position left) TRUE: TD2 on (right position)
stateOutput1	Int	0	See Table 1-3
stateOutput2	Int	0	See Table 1-3
stateOutput3	Int	0	See Table 1-3
stateOutput4	Int	0	See Table 1-3
stateOutput5	Int	0	See Table 1-3
stateOutput6	Int	0	See Table 1-3
stateOutput7	Int	0	See Table 1-3
stateOutput8	Int	0	See Table 1-3
outputCurrent1	Int	0	Output current at output 1
outputCurrent2	Int	0	Output current at output 2
outputCurrent3	Int	0	Output current at output 3
outputCurrent4	Int	0	Output current at output 4
outputCurrent5	Int	0	Output current at output 5
outputCurrent6	Int	0	Output current at output 6
outputCurrent7	Int	0	Output current at output 7
outputCurrent8	Int	0	Output current at output 8
outputCurrentLimit1	Int	0	Current limit value output 1
outputCurrentLimit2	Int	0	Current limit value output 2
outputCurrentLimit3	Int	0	Current limit value output 3
outputCurrentLimit4	Int	0	Current limit value output 4
outputCurrentLimit5	Int	0	Current limit value output 5
outputCurrentLimit6	Int	0	Current limit output 6

Parameters	Data type	Start value	Description
outputCurrentLimit7	Int	0	Current limit value 7
outputCurrentLimit8	Int	0	Current limit value 8
reasonOutputSwitchedOff1	Int	0	See Table 1-7
reasonOutputSwitchedOff2	Int	0	See Table 1-7
reasonOutputSwitchedOff3	Int	0	See Table 1-7
reasonOutputSwitchedOff4	Int	0	See Table 1-7
reasonOutputSwitchedOff5	Int	0	See Table 1-7
reasonOutputSwitchedOff6	Int	0	See Table 1-7
reasonOutputSwitchedOff7	Int	0	See Table 1-7
reasonOutputSwitchedOff8	Int	0	See Table 1-7
nominalOutputCurrent	Int	3	Rated current
outputNumber	Int	4	Number of outputs
productState	Int	1	Product version
firmwareVersion	Int	1	Firmware version
startupSequence	Int	0	0: Load-dependent ramp-up 1: Time delay acceleration 25 ms 2: Time delay acceleration 200 ms 3: Time delay ramp-up 500 ms
setReset	Bool	FALSE	This parameter initiates the resetting of the outputs, e.g. via digital input or HMI keypad.
stateReset	Bool	FALSE	TRUE: At least one output must be reset. FALSE: No output must be reset.
stateNoCommunication	Bool	FALSE	TRUE: At least 9 s no signal detected at input "impulse" of the FB. FALSE: Communication ok, signal at input "impulse" of the FB is detected and evaluated.
articleNumber	String	6EP4437-7FB00-0CX0	Item number
serialNumber	String	Q6/L1	Part of serial number

2.1.2 FB "LSEL_SignalEvaluationS71200"

The FB "LSEL_SignalEvaluationS71200" reads the signal of the diagnostic interface "COM" at the input "impulse" in order to evaluate the signal profile and to store the contents of the 4 telegrams in a predefined data structure at the output "dataSel".

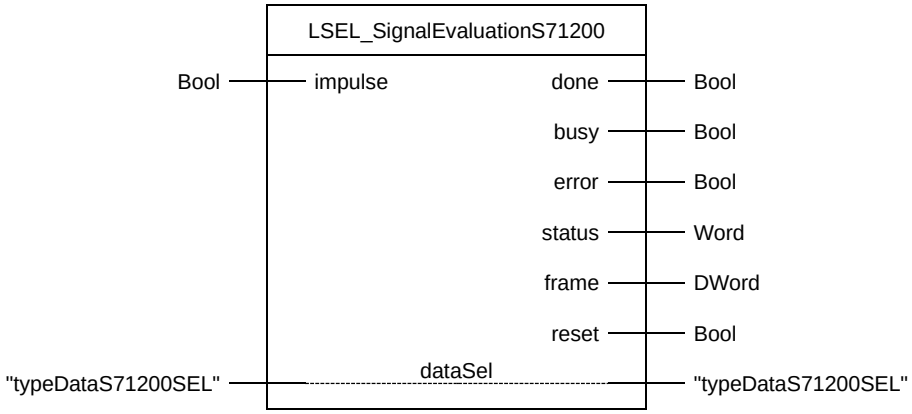
Figure 2-1 shows the call of the FB "LSEL_SignalEvaluationS71200" in the user program.

Call the FB "LSEL_SignalEvaluationS71200" in the user program of the S7 CPU in a cyclic interrupt OB with at most a 10 ms cycle time.

The cycle time must not exceed 10 ms so that every high level in the signal path of the diagnostics interface "COM" is detected.

Note If the cycle time exceeds 10 ms, the FB "LSEL_SignalEvaluationS71200" outputs an error with the value 16#8001 at the output "status".

Figure 2-1



The following Table shows the parameters of the FB "LSEL_SignalEvaluationS71200".

Table 2-2

Name	P type	Data type	Comment
impulse	IN	Bool	Input via which the signal of the diagnostic interface "COM" is read in.
done	OUT	Bool	1: A telegram was evaluated completely and without errors. The data are stored in the predefined data structure at the output "dataSel". The data of the output "dataSel" can be transferred. The output "done" is set to the value "1" for one cycle. 0: Telegram evaluation running, or no signal detected at input "impulse".
busy	OUT	Bool	1: FB "LSEL_SignalEvaluationS71200" is active 0: If done = 1, then a telegram was evaluated completely and without errors. The content of the telegram is stored in a predefined data structure at the output "dataSel". The data of the output "dataSel" can be transferred.
Error	OUT	Bool	1: An error occurred during the processing of the routine. The output "error" is set to the value "1" for one cycle. 0: No error
status	OUT	Word	Status display If error = 1, the "status" output indicates the error number for a cycle. If error = 0, the value 16#0000 is displayed at the "status" output.
frame	OUT	DWord	Binary code of the received telegram
reset	OUT	Bool	1: Reset outputs of SEL1200 / SEL1400 0: Do not reset the outputs of the SEL1200 / SEL1400.
dataSel	IN_OUT	"typeDataS71200SEL"	Predefined data structure in which the status information and the payloads of the telegrams are stored. Detailed information on the structure of the predefined data structure can be found in chapter 2.1.1.

Note

The instance DB of the FB "LSEL_SignalEvaluationS71200" is generated when the FB "LSEL_SignalEvaluationS71200" is called. For each call of the FB "LSEL_SignalEvaluationS71200" you need a separate instance DB. The FB "LSEL_SignalEvaluationS71200" must not be called multiple times with the same instance DB.

2.1.3 FB "LSEL_SignalEvaluationS71500"

The FB "LSEL_SignalEvaluationS71500" reads the signal of the diagnostic interface "COM" at the input "impulse" in order to evaluate the signal profile and to store the contents of the 4 telegrams in a predefined data structure at the output "dataSel".

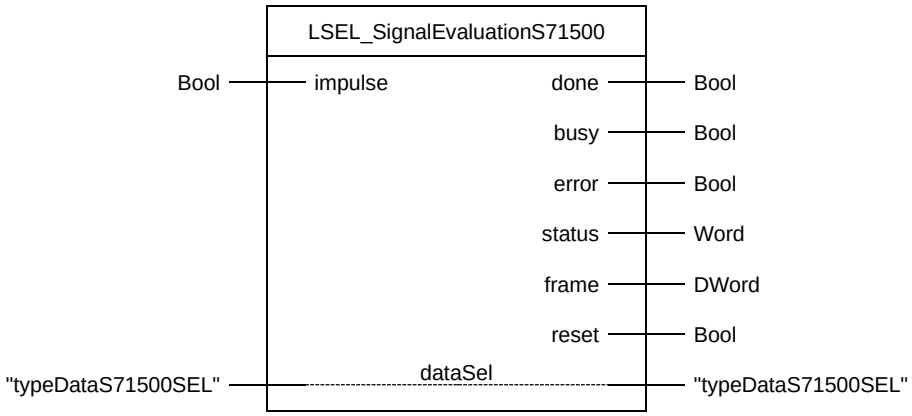
Figure 2-2 shows the call of the FB "LSEL_SignalEvaluationS71500" in the user program.

Call the FB "LSEL_SignalEvaluationS71500" in the user program of the S7 CPU in a cyclic interrupt OB of maximum 10 ms.

The cycle time must not exceed 10 ms so that every high level in the signal path of the diagnostics interface "COM" is detected.

Note If the cycle time exceeds 10 ms, the FB "LSEL_SignalEvaluationS71500" outputs an error with the value 16#8001 at the output "status".

Figure 2-2



The following Table shows the parameters of the FB "SEL_SignalEvaluationS71500".

Table 2-3

Name	P type	Data type	Comment
impulse	IN	Bool	Input via which the signal of the diagnostic interface "COM" is read in.
done	OUT	Bool	1: A telegram was evaluated completely and without errors. The data are stored in the predefined data structure at the output "dataSel". The data of the output "dataSel" can be transferred. The output "done" is set to the value "1" for one cycle. 0: Telegram evaluation running, or no signal detected at input "impulse".
busy	OUT	Bool	1: FB "LSEL_SignalEvaluationS71500" is active 0: If done = 1, then a telegram was evaluated completely and without errors. The content of the telegram is stored in a predefined data structure at the output "dataSel". The data of the output "dataSel" can be transferred.
Error	OUT	Bool	1: An error occurred during the processing of the routine. The output "error" is set to the value "1" for one cycle. 0: No error
status	OUT	Word	Status display If error = 1, the "status" output indicates the error number for a cycle. If error = 0, the value 16#0000 is displayed at the "status" output.
frame	OUT	DWord	Binary code of the received telegram
reset	OUT	Bool	1: Reset outputs of SEL1200 / SEL1400 0: Do not reset the outputs of the SEL1200 / SEL1400.
dataSel	IN_OUT	"typeDataS71500SEL"	Predefined data structure in which the status information and the payloads of the telegrams are stored. Detailed information on the structure of the predefined data structure can be found in section 2.1.1.

Note

The instance DB of the FB "LSEL_SignalEvaluationS71500" is generated when the FB "LSEL_SignalEvaluationS71500" is called. For each call of the FB "LSEL_SignalEvaluationS71500" you need a separate instance DB. The FB "LSEL_SignalEvaluationS71500" must not be called more than once with the same instance DB.

2.1.4 Faceplate "fpUnfOverviewS71x00SEL"

The following faceplates provide various parameter assignment properties via the interfaces:

- "fpUnfOverviewS71200SEL"
- "fpUnfOverviewS71500SEL"

Here, the interfaces fulfil the following purposes:

- Tag interface: Property for tag connection
- Property interface: Property for linking text lists

Figure 2-3

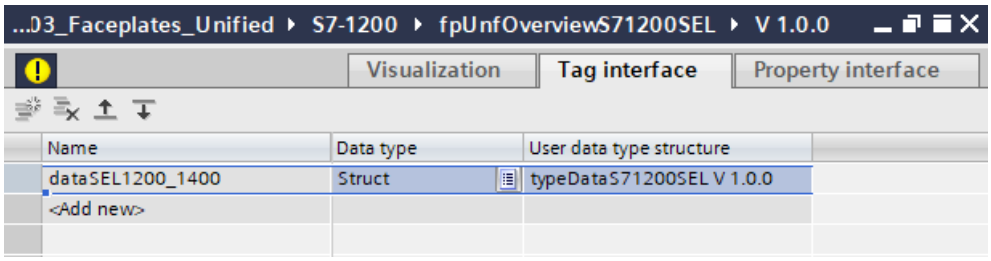
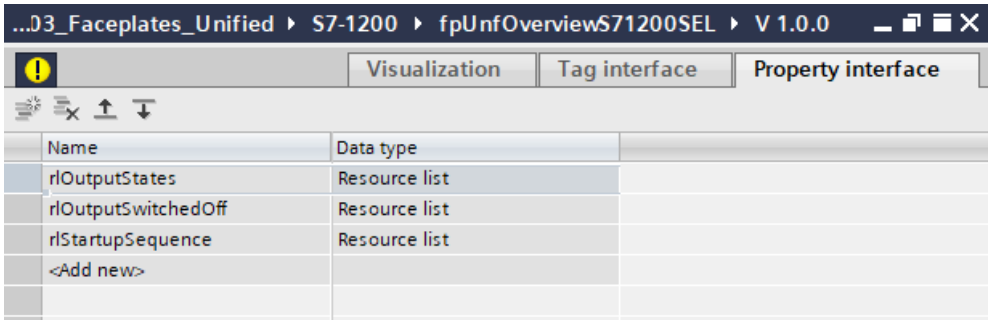
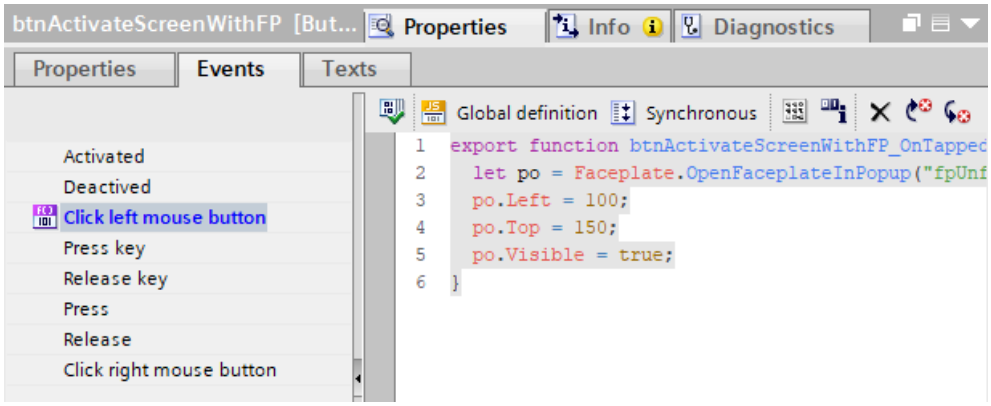


Figure 2-4



You can specify an event to be executed when the faceplate is pressed. Use the "Events" tab to do this.

Figure 2-5



2.1.5 Faceplate "fpUnfDetailS71x00SEL"

The following faceplates provide various parameter assignment properties via the interfaces:

- "fpUnfDetailS71200SEL"
- "fpUnfDetailS71500SEL"

Here, the interfaces fulfil the following purposes:

- Tag interface: Property for tag connection and internal screen navigation
- Property interface: Property for linking text lists

Figure 2-6

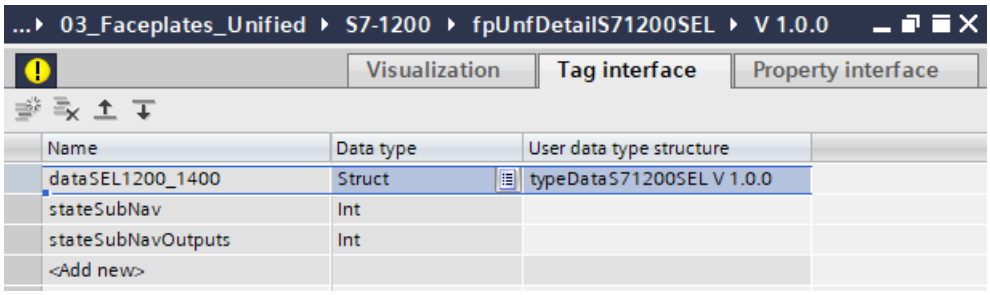
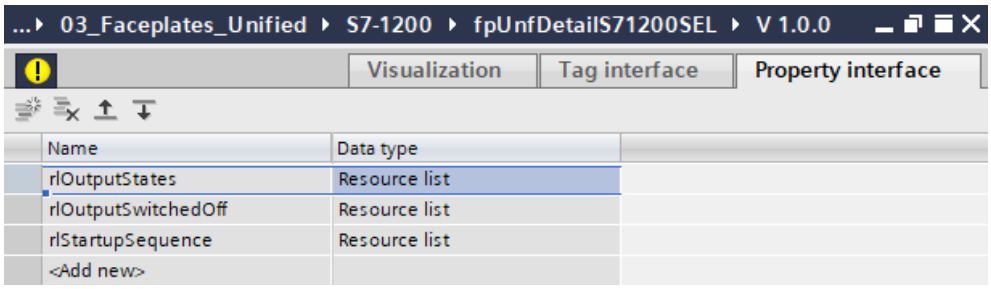


Figure 2-7

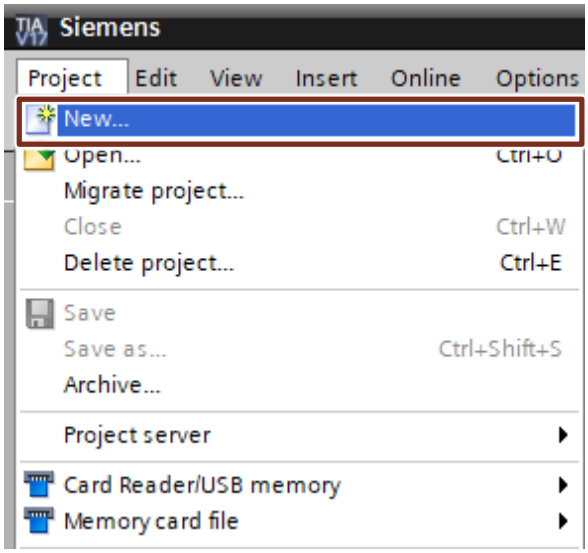


2.2 Configuration

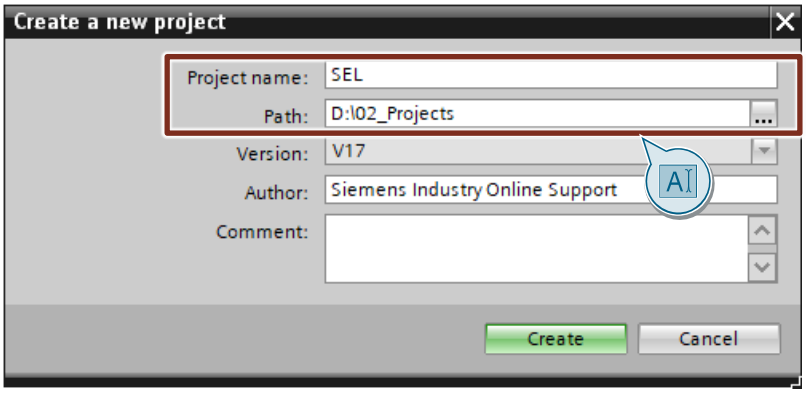
2.2.1 Creating a TIA Portal Project

1. Open the TIA Portal.
2. Switch to the "Project view".

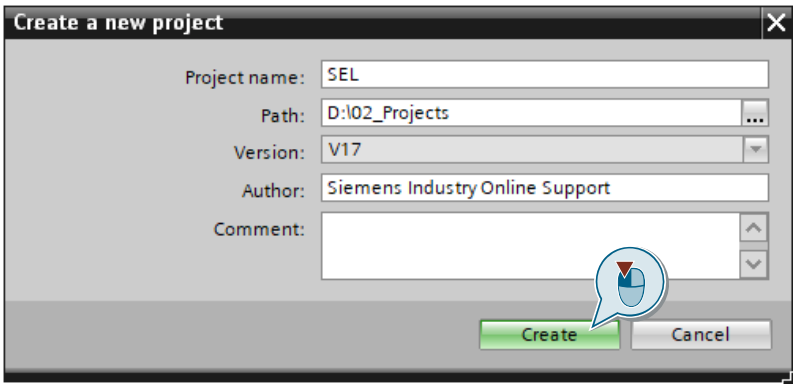
   From the "Project" menu, select "New".
   The "Create a new project" dialog opens.



3. Enter your project name and path or accept the proposed data.



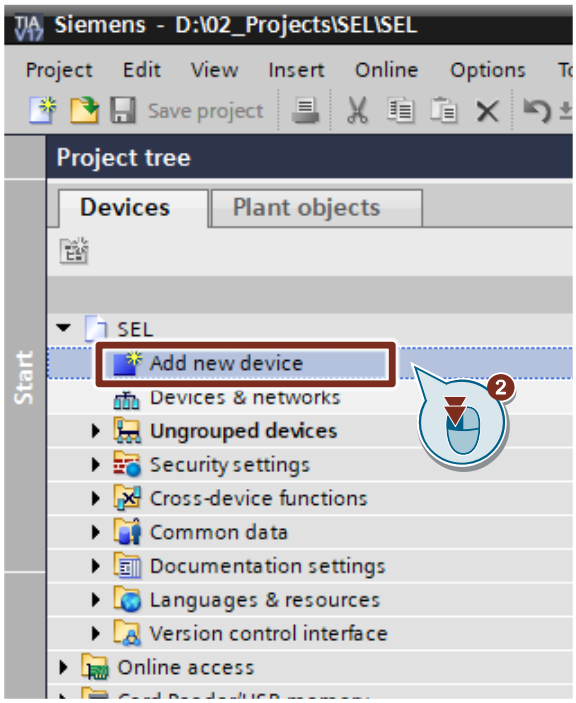
4. Click on the "Create" button. The new project is created and displayed in the project tree.



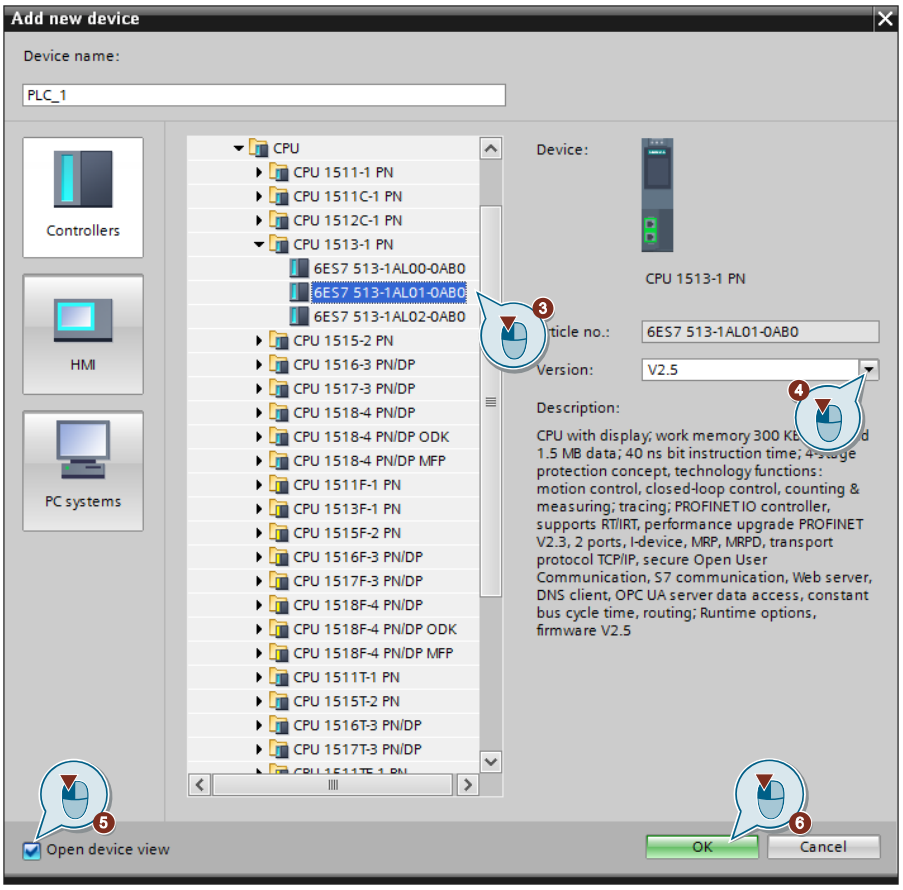
2.2.2 Integrate an S7 CPU into the user project

Add S7 CPU via hardware catalog

1. Open the project tree.
2. Double-click the "Add new device" command to add a new PLC device.
   The dialog box "Add new device" opens.

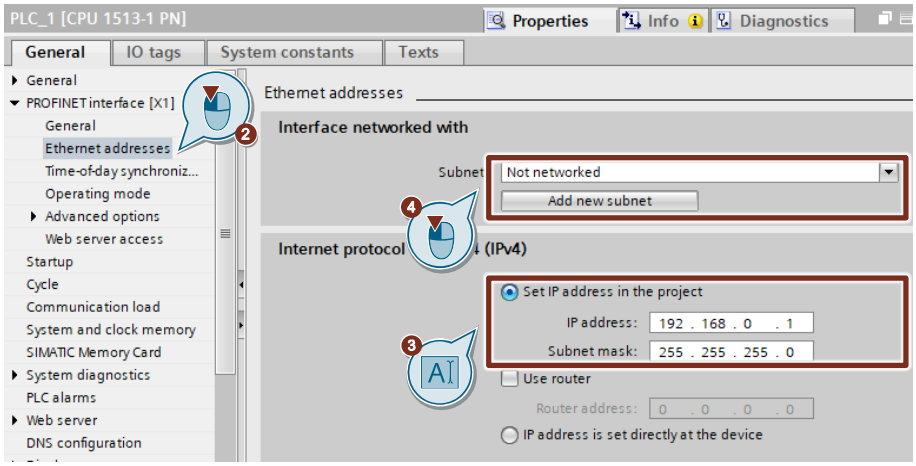


3. Under "Controllers", select the part number of the desired S7 CPU.
4. Set the firmware status via the drop-down list of the dialog.
5. Check the checkbox "Open Device view".
6. Click the "OK" button to add the selected S7 CPU.
   The dialog box closes and the "Device view" of the S7 CPU opens in the hardware and network editor.



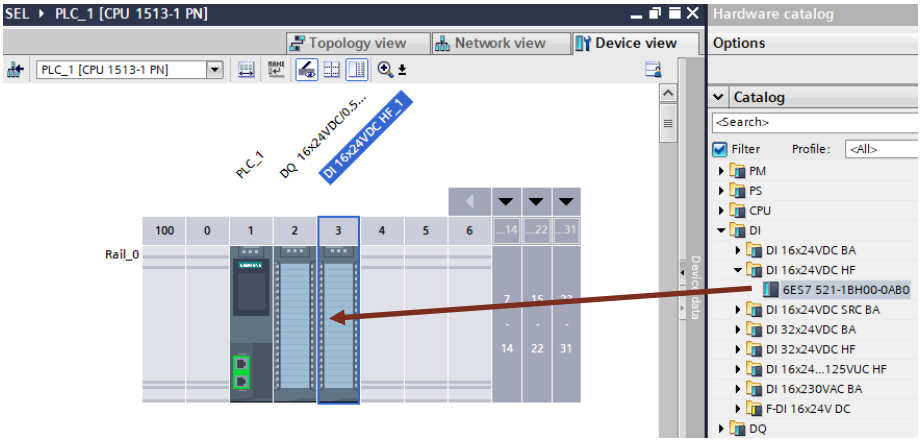
Adjust hardware configuration for S7 CPU

1. Select the S7 CPU in the graphical area of the Device view. The "Properties" of the S7 CPU are displayed in the Inspector window.
2. In the "General" tab, navigate to "PROFINET interface [X1] > Ethernet addresses".
3. Enter the IP address and subnet mask of the S7 CPU.
4. Click on the "Add new subnet" button or select an existing subnet from the drop-down list.

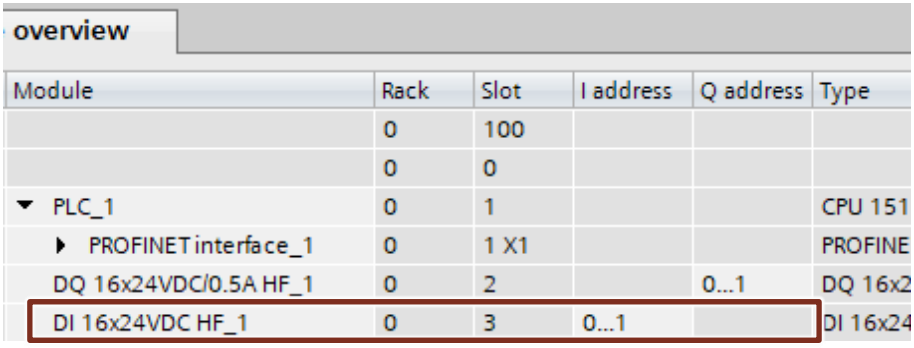


Integration of a digital input module into the user project

1. Open the Device view of the S7 CPU or the decentralized periphery, e.g. ET 200SP.
2. Select the desired digital input module in the "Hardware catalog".
3. Paste the selected digital input module via drag & drop into the slot where it is located in the actual hardware setup.



4. The preset address of the digital inputs is displayed in the table area of the device view. You can change it if necessary.



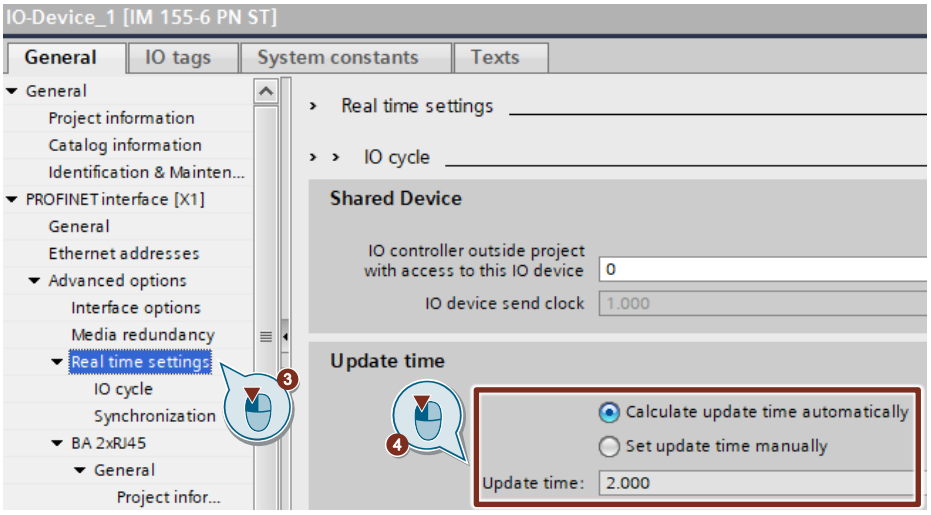
overview

Module	Rack	Slot	I address	Q address	Type
	0	100			
	0	0			
PLC_1	0	1			CPU 151
PROFINET interface_1	0	1 X1			PROFINE
DQ 16x24VDC/0.5A HF_1	0	2		0...1	DQ 16x2
DI 16x24VDC HF_1	0	3	0...1		DI 16x24

Set update time

If you read in the diagnostic interface "COM" of the SEL1200 or SEL1400 via a digital input module of the decentralized periphery, e.g. ET 200SP, the update time must not exceed 16 ms. You can have the update time calculated automatically or set it manually:

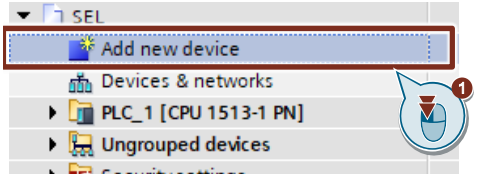
1. Open the Device view of the decentralized periphery, e.g. ET 200SP.
2. In the graphical area of the Device view, select the Interface Module (IM) of the ET 200SP. The "Properties" of the decentralized periphery are displayed in the Inspector window.
3. Navigate in the "General" tab to "PROFINET Interface [X1] > Advanced Options > Real-Time Settings".
4. Set the update time (max. 16 ms).



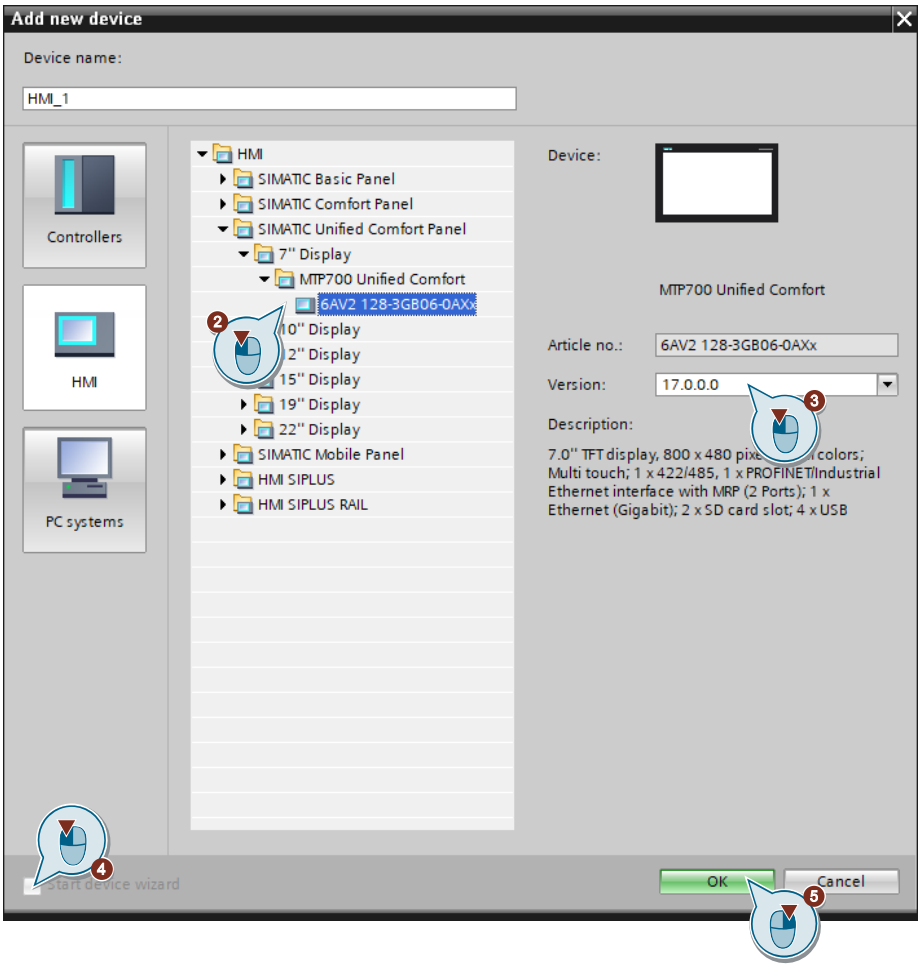
2.2.3 Integrate an HMI operator device

Adding an HMI Operator Panel

1. Add a new device to your project via "Project tree > Add new device".
   The dialog box "Add new device" opens.

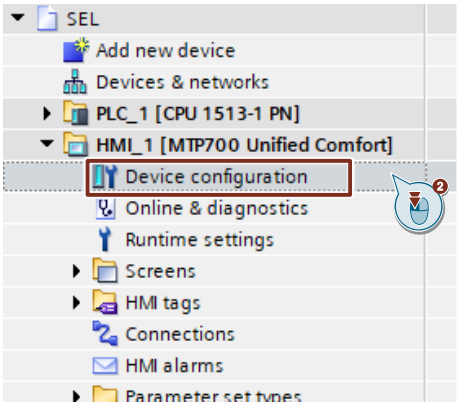


2. Select the desired HMI operating device under "HMI" and assign a name.
3. **Optional**
   If necessary, set the software version via the drop-down list of the dialog.
4. Select the check box "Start device wizard".
5. Click on the "OK" button to add the selected HMI Operator Panel. The dialog box closes, and the inserted HMI device is displayed in the project tree.

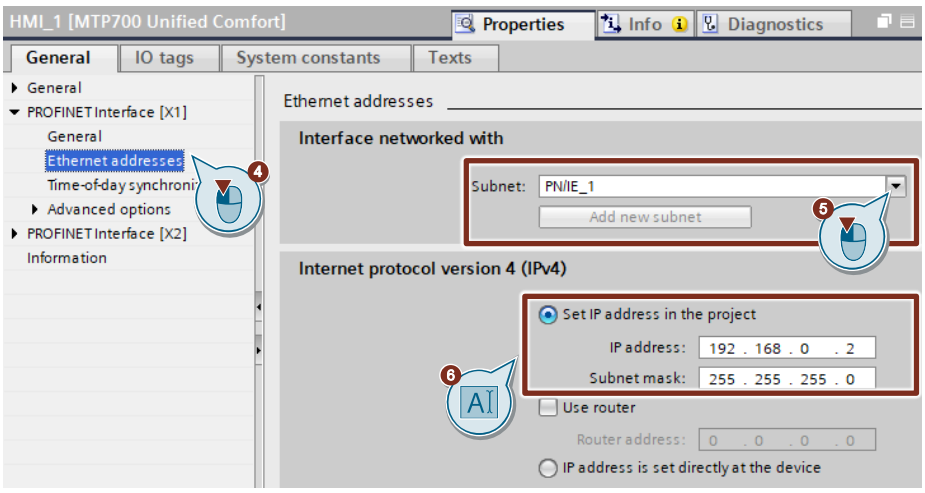


Configuring the HMI device

1. Use the project tree to navigate to the device folder of the HMI Operator Panel.
2. Double-click on the "Device configuration" command to open the hardware and network editor in the "Device view" of the HMI operating device.

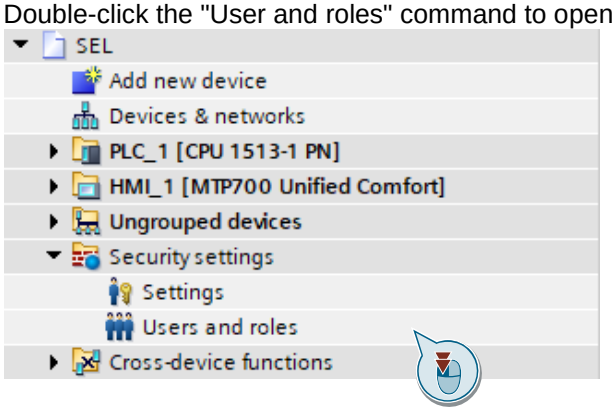


3. Mark the HMI operating device in the graphical area of the "Device view".
   The "Properties" of the HMI Operator Panel are displayed in the Inspector window.
4. In the "General" tab, navigate to "PROFINET interface [X1] > Ethernet addresses".
5. Use the drop-down list to select the subnet to which the S7 CPU is connected.
6. Enter the IP address and subnet mask of the HMI operator device.

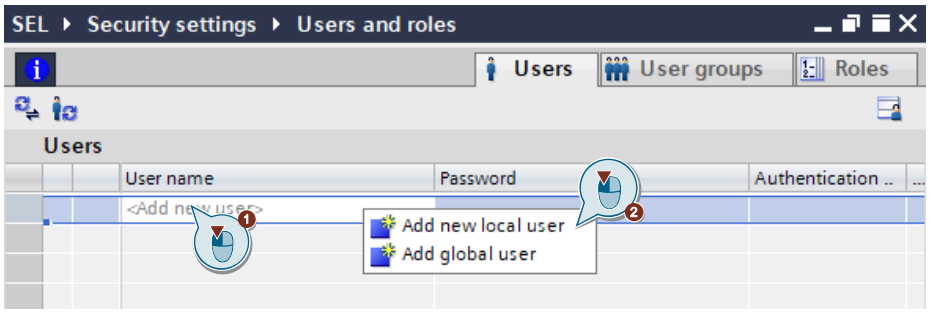


2.2.4 Create HMI users

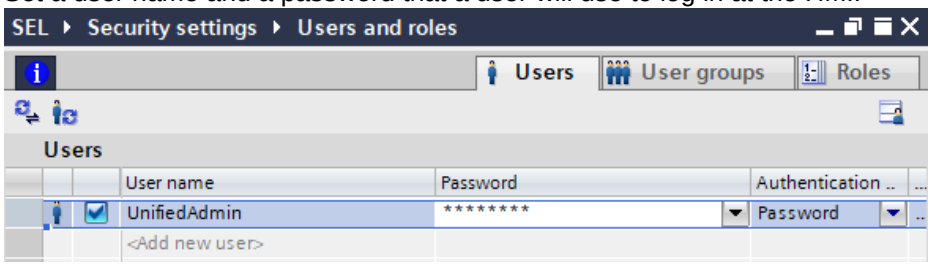
1. Navigate to the "Security settings" folder via the "Project tree".
2. Double-click the "User and roles" command to open the settings for users and roles.



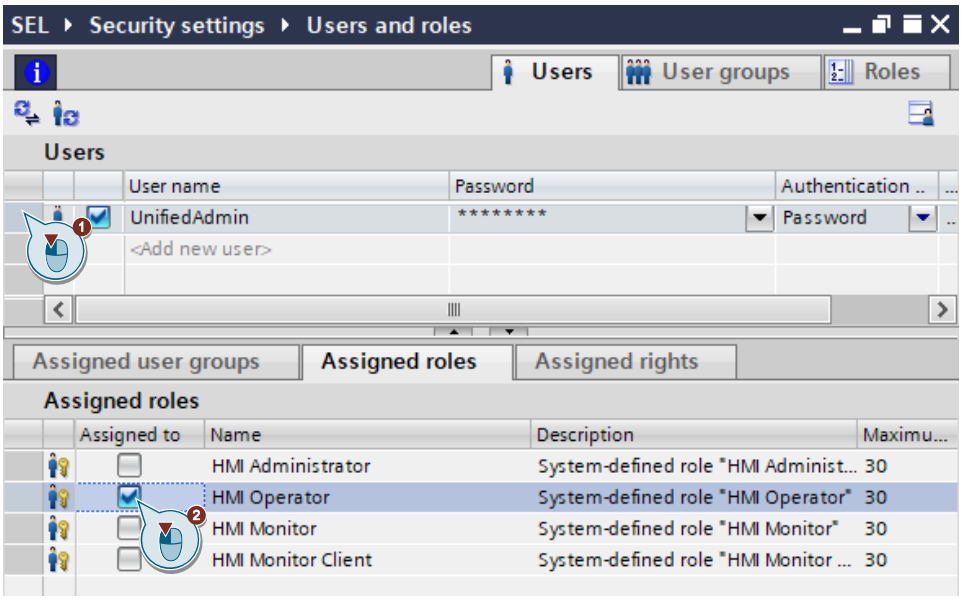
3. Click in the "User name" column on "<Add new user>" and create a new local user.



4. Set a user name and a password that a user will use to log in at the HMI.



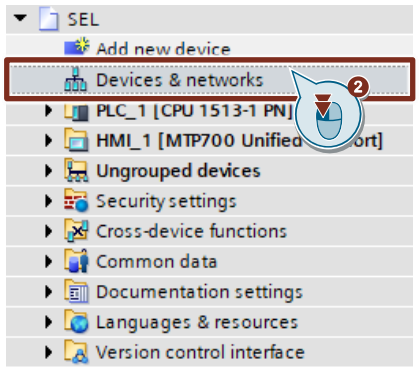
5. Select the line with the user you just created and, in the "Assigned roles" area, assign the user the "HMI Operator" role.



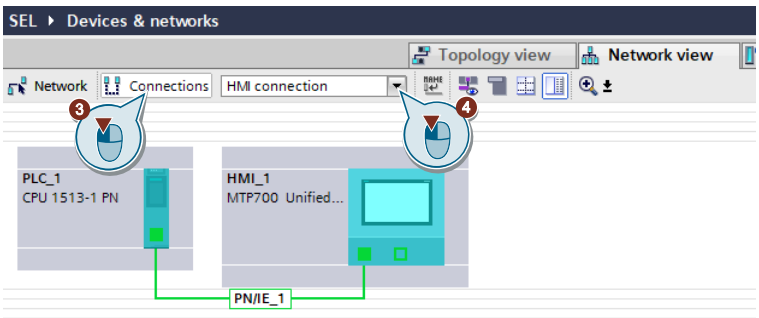
2.3 Creating communication

2.3.1 Creating an HMI Connection

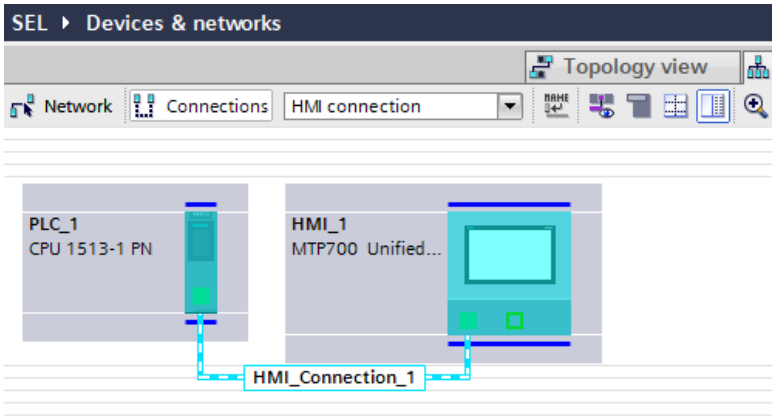
1. Open the project tree.
2. Double-click the Devices & Networks command to open the Network view graphical area.

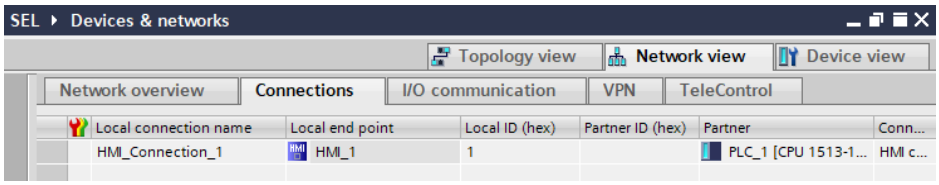


3. In the toolbar (symbol bar), click the "Connections" icon. This enables the connection mode.
4. Select the connection "HMI connection" in the adjacent drop-down list.
   In the network view, all S7 CPUs and HMI devices that can be used for an HMI connection are highlighted in color.

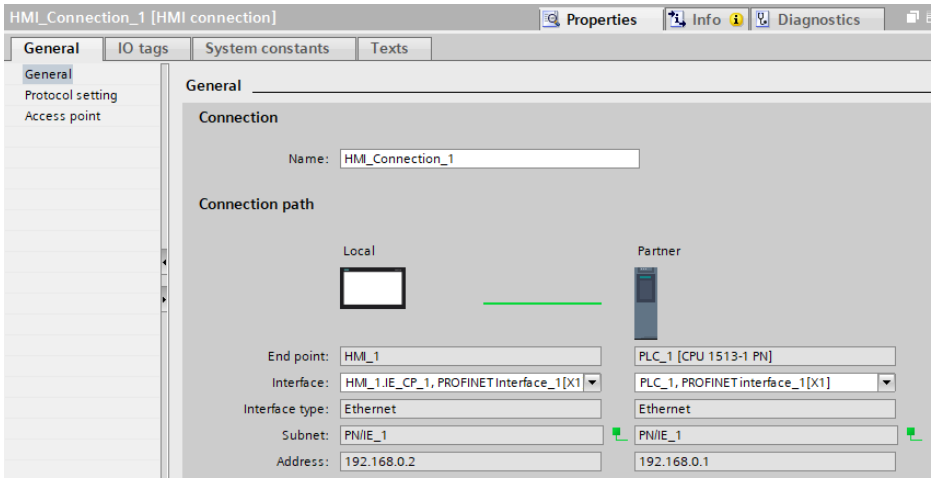


5. You can now have the connection path automatically defined or explicitly define a connection path via specific interfaces:
   - Having connection path defined automatically:
     Select the CPU from which a connection is to be set up. Move the mouse to the target component. Confirm the connection end point with another mouse click.
   - Select explicit connection path from interface to interface:
     Click on the subnet interface in the device from which you want to start a connection. Then move the mouse pointer while holding the mouse button down to the desired interface in the target device and release the mouse button.
6. In the network view, the created HMI connection is displayed in the graphical and tabular area (tab "Connections").



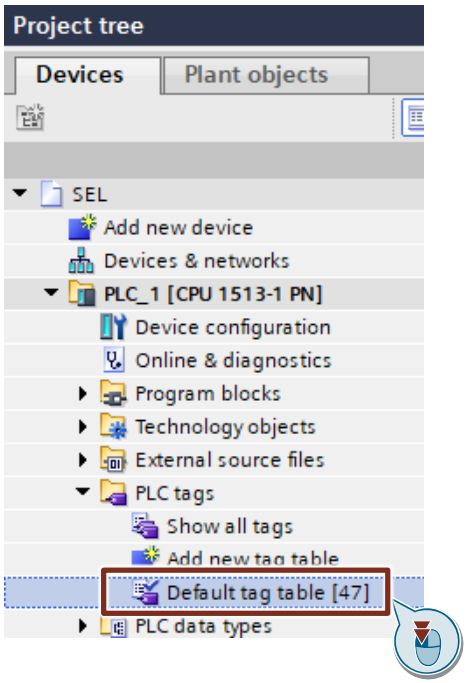


7. The connection settings are displayed in the Inspector window.
   If necessary, change the name of the connection (e.g. "S7_1500").

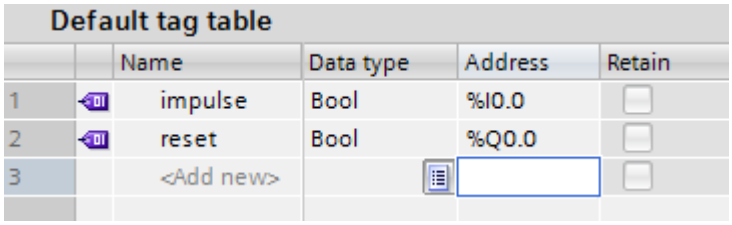


2.3.2 Create PLC tags

1. Navigate in the "Project tree" to the device folder of the S7 CPU.
2. In the "PLC tags" folder, double-click the "Default tag table".
   The default tag table opens in the work area.



3. In the column "Address" enter the address of the digital input via which the diagnostics interface "COM" is read in.
4. Select the "Bool" data type in the "Date type" column.
5. Enter a name of your choice for the PLC variable in the column "Name".
6. In the "Address" column, enter the address of the digital output via which the RESET input of the SEL1200 / SEL1400 is controlled.
7. Select the "Bool" data type in the "Date type" column.
8. Enter a name of your choice for the PLC variable in the column "Name".



Default tag table

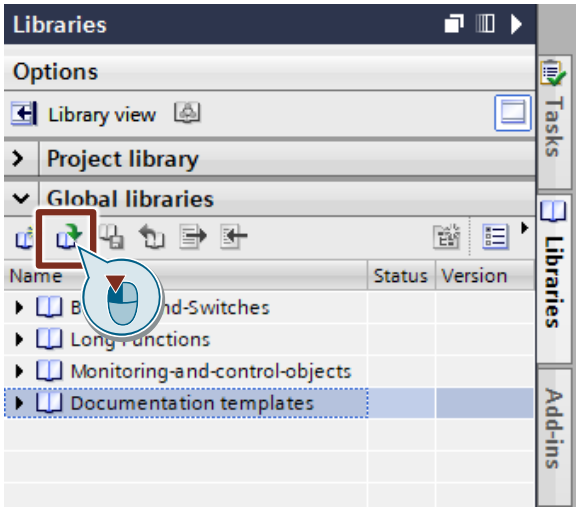
		Name	Data type	Address	Retain
1		impulse	Bool	%I0.0	
2		reset	Bool	%Q0.0	
3		<Add new>			

2.4 Integrating the function blocks into the user program

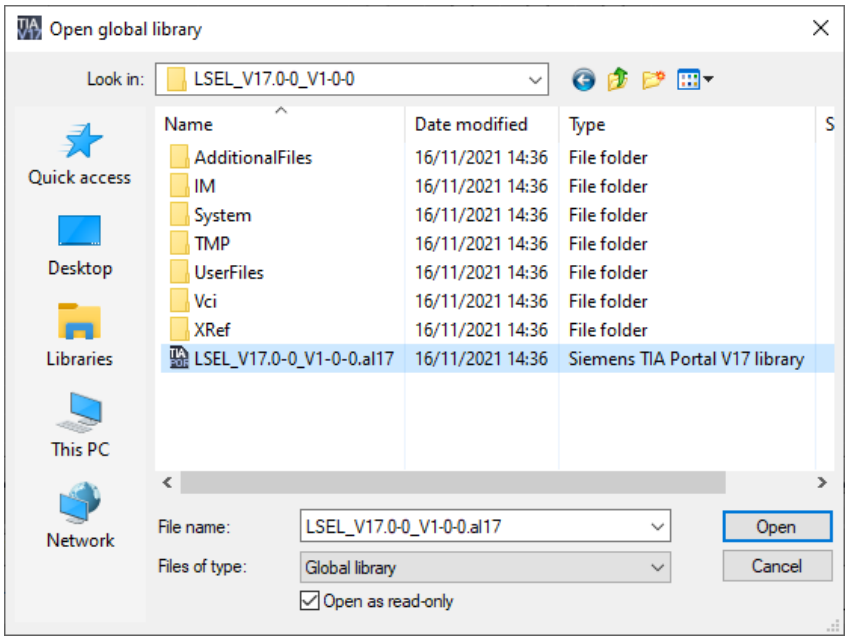
2.4.1 Open the "LSEL_V17.0-0_V1-0-0" library in STEP 7

Note For this chapter, you will need to have downloaded the library "LSEL_V17.0-0_V1-0-0.zip" and extracted it to a folder of your choice.

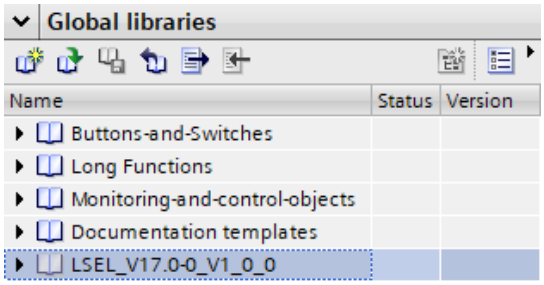
1. Click on the "Libraries" task card and open the palette "Global libraries".
2. Click the "Open global library" button to open the "LSEL_V17.0-0_V1-0-0" library. The corresponding dialog will open.



3. Select the "LSEL_V17.0-0_V1-0-0.al17" global library and confirm your selection with "Open".

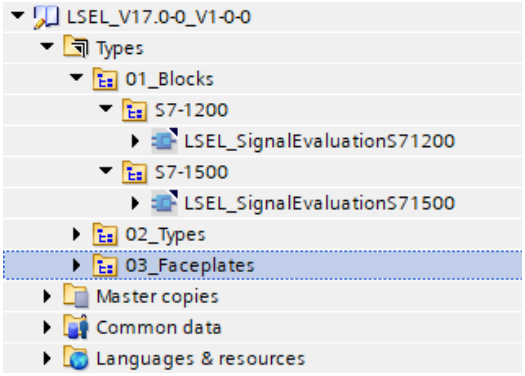


4. The "LSEL_V17.0-0_V1-0-0.al17" library opens and appears under the "Global libraries" palette.

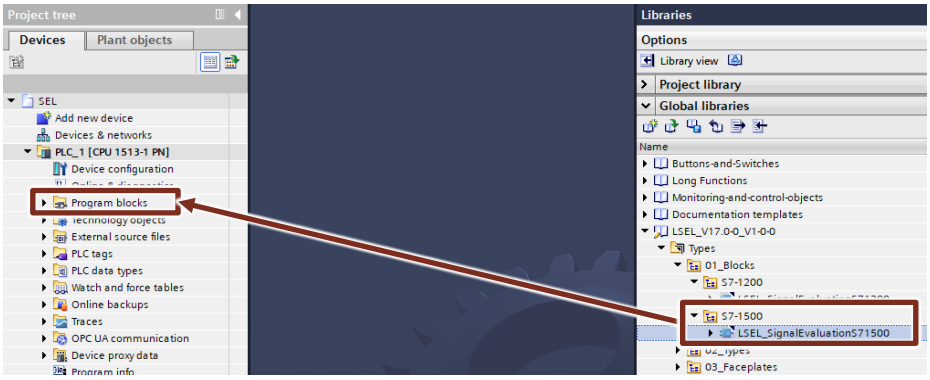


2.4.2 Copy data types and function blocks into the user project

1. In the library you find under "Types > 01_Blocks" the function blocks for communication for the S7-1200 CPUs and S7-1500 CPUs.
   - S7-1200: "LSEL_SignalEvaluationS71200" function block
   - S7-1500: Function block "LSEL_SignalEvaluationS71500"



2. Insert the function block for your S7 CPU via drag & drop into the folder "Program blocks" of your device, e.g. S7-1500 CPU.

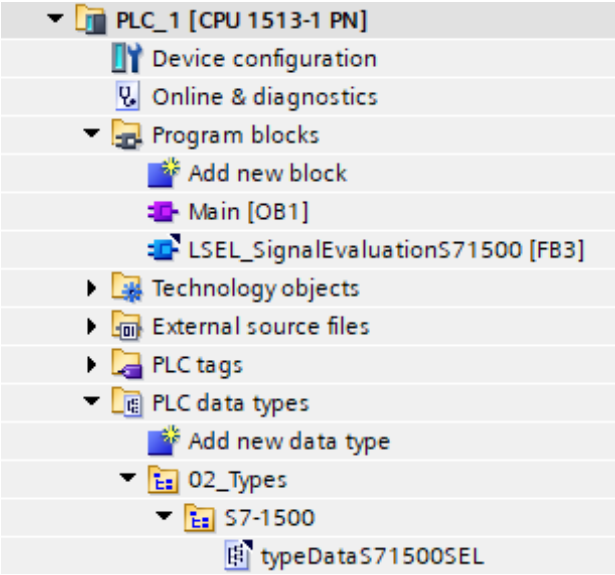


Note

The function blocks each use their own user-defined data type (UDT).

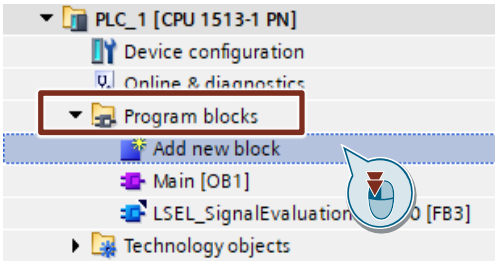
- S7-1200: "typeDataS71200SEL"
- S7-1500: "typeDataS71500SEL"

This is automatically inserted into the "PLC data types" folder of your S7 CPU when the respective function block is inserted.

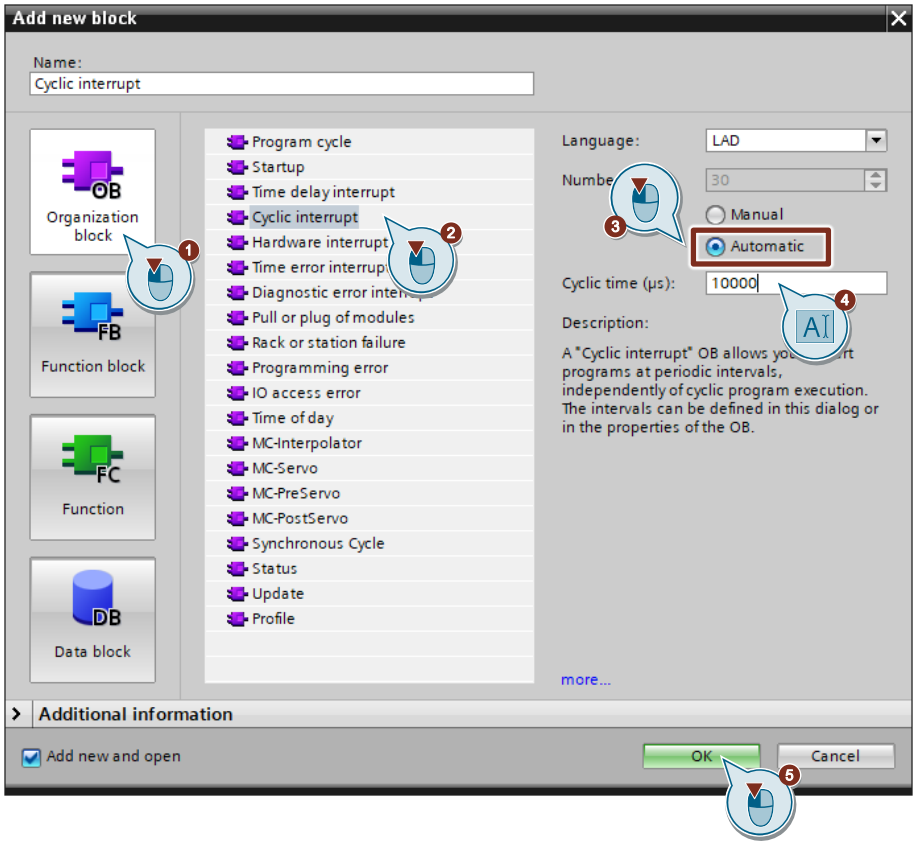


2.4.3 Create cyclic interrupt OB

1. Navigate in the "Project tree" to the device folder of the S7 CPU.
2. Open the "Program blocks" folder and double-click the "Add new block" command to add a wake-up cyclic interrupt OB.
   The dialog "Add new block" opens.



3. Make the following settings and then confirm your entries with the "OK" button.
   - Select the "Organization block" icon.
   - Select the entry "Cyclic interrupt" to create a cyclic interrupt OB.
   - Enable the "Automatic" radio button for automatic number assignment. The number of the cyclic interrupt OB is assigned by STEP 7 (TIA Portal).
   - Enter the cycle time. The cycle time is given in microseconds (µs). To call the FB "LSEL_SignalEvaluationS71200" and "LSEL_SignalEvaluationS71500", the cycle time must not exceed 10 ms (= 10000 µs).
   - Click "OK" to apply the settings.

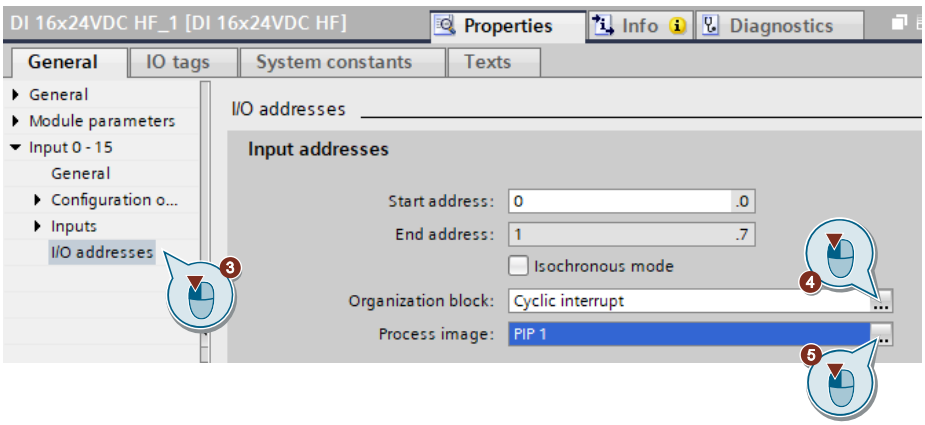


2.4.4 Assign the process image partition (PIP) of the digital input module to the cyclic interrupt OB.

The process image contains the image of the digital input module and digital output module and is divided accordingly into an input process image and an output process image. The process image can be divided into individual process image partitions that can be updated either automatically or by the user program.

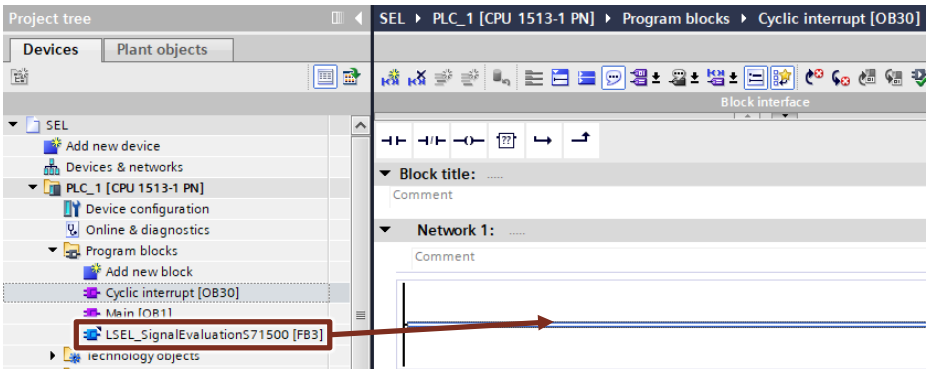
An input is the image of the corresponding bit on the digital input module. The interrogation of an input is equivalent to the interrogation of the bit directly on the module. After the CPU start-up and before the first processing of OB 1, the operating system transfers the signal states of the digital input module into the input process image. Then the OB 1 is processed. Following termination of OB1, a new cycle begins with updating of the process image. Since the OB 1 cycle can be very long, depending on the user program, and can be interrupted several times by the alarm interrupt OB, you must assign a process image partition of the digital input module to the cyclic interrupt OB. Thus, the process image partition is automatically updated when the wake-up cyclic interrupt OB is called.

1. Open the Device view of the S7 CPU or the decentralized periphery, e.g. ET 200SP.
2. Select the digital input module in the graphical area of the Device view. The "Properties" of the digital input module are displayed in the Inspector window.
3. In the "General" tab, navigate to "Input 0 - x > I/O addresses".
4. Select the cyclic interrupt OB under "Organization block".
5. Under "Process image", select the desired process image partition, e.g. "PIP 1".

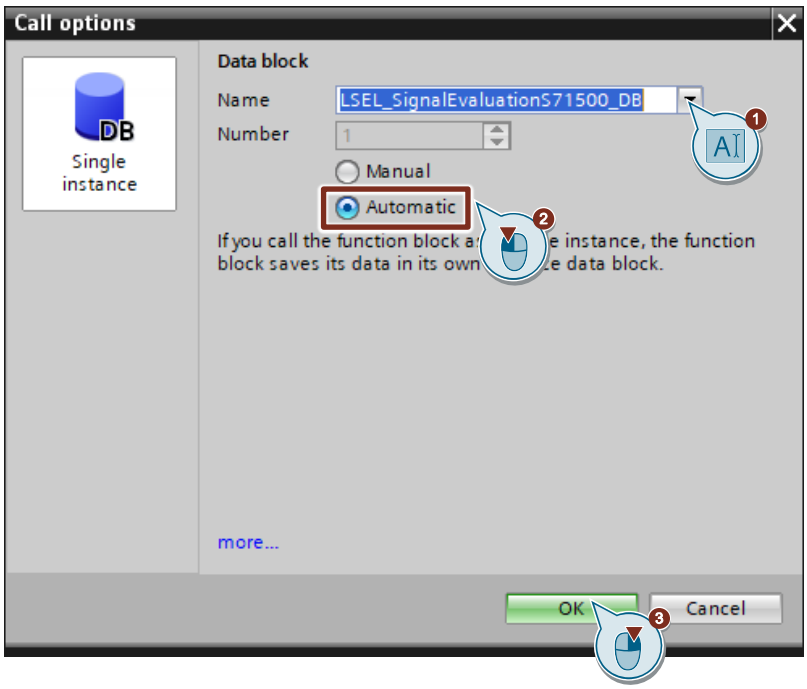


2.4.5 Integrate signal evaluation block into cyclic interrupt

1. Double-click the cyclic interrupt OB to open the corresponding program editor.
2. Drag and drop the FB "LSEL_SignalEvaluationS71200" or FB "LSEL_SignalEvaluationS71500" from the project tree into any network of the cyclic interrupt OB.



3. The "Call options" dialog for generating the instance DB of the FB "LSEL_SignalEvaluationS71200" or "LSEL_SignalEvaluationS71500" will open automatically.
4. Make the following settings and then confirm your entries with the "OK" button.
   - Enter the name of the instance DB.
   - Check the "Automatic" radio button for the automatic number assignment. The instance DB number is assigned by STEP 7 (TIA Portal).
   - Click "OK" to apply the settings.

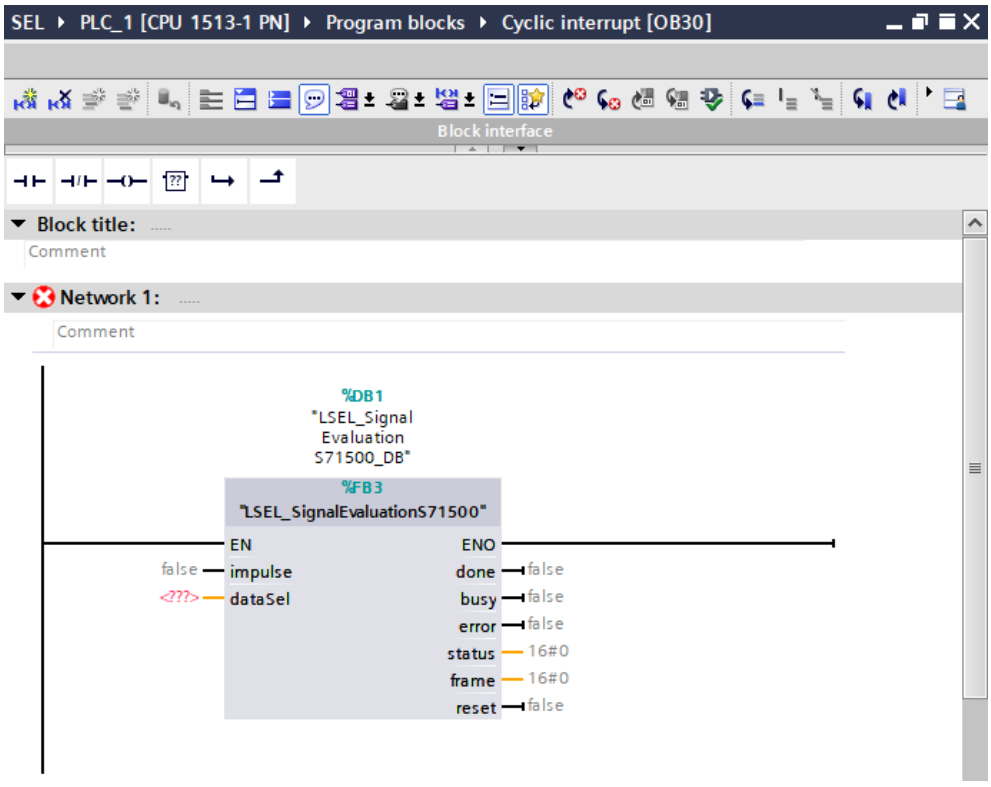


Note

The "LSEL_SignalEvaluationS71500" signal evaluation block will be inserted into the call structure of the cyclic interrupt OB.

Tag connections are made via a global data block; see chapter 2.4.6 and 2.4.7.

Figure 2-8

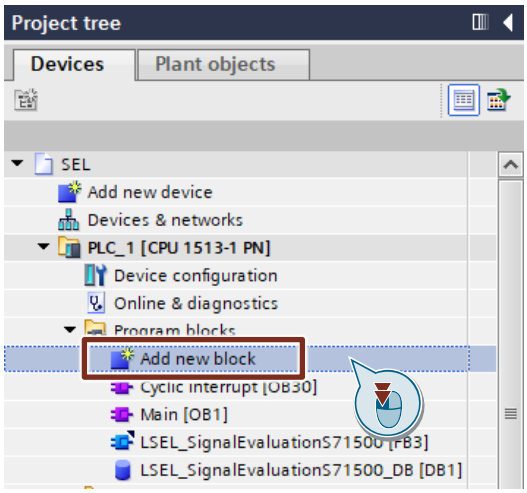


2.4.6 Create a global data block for data exchange

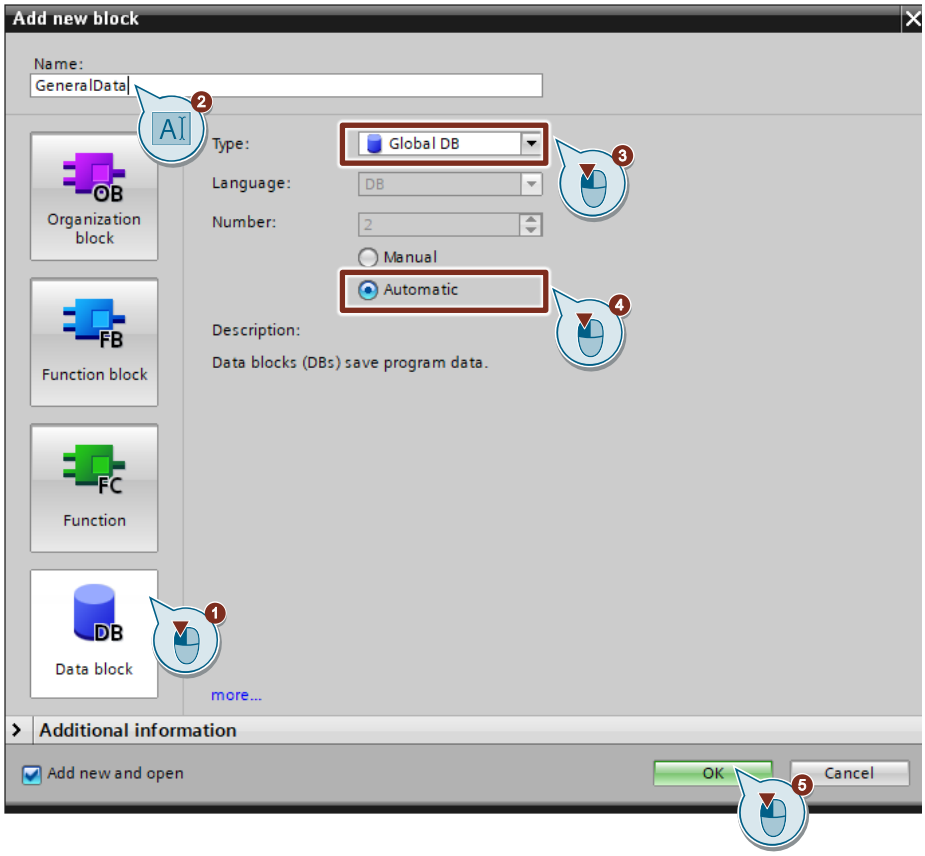
Note

This chapter will show you how to create a global data block for data exchange. This data block is used for storing the data from the SITOP SEL1200 and SEL1400 that were read using the FB "LSEL_SignalEvaluationS71200" and "LSEL_SignalEvaluationS71500".

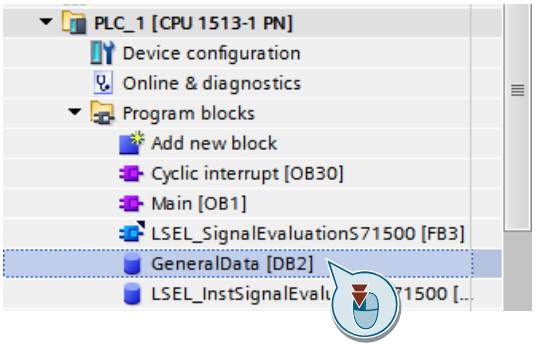
1. Navigate in the "Project tree" to the device folder of the S7 CPU.
2. Open the folder "Program blocks" and double-click on the command "Add new block". ("Add new block") to add a new data block.
   The dialog "Add new block" opens.



3. Make the following settings and then confirm your entries with the "OK" button.
   - Select the symbol "Data block".
   - Select "Global DB" as the type.
   - Enter the name of the DB
   - Enable the "Automatic" radio button for automatic number assignment. The number of the global DB is assigned by STEP 7 (TIA Portal).



4. Double-click the newly inserted global data block to open it.



5. Double-click "<Add new>" to create the tags as per Table 2-4.

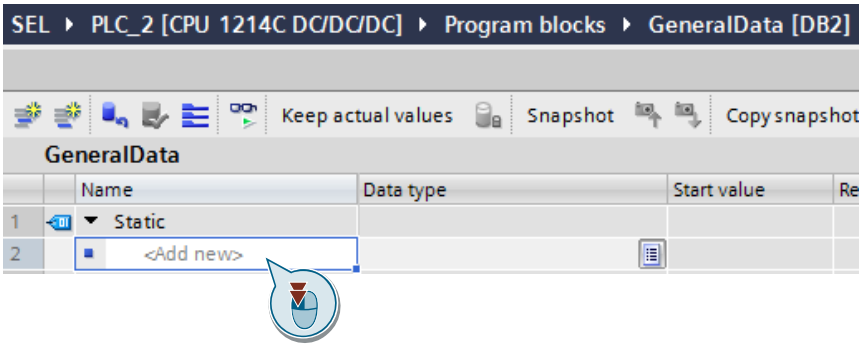
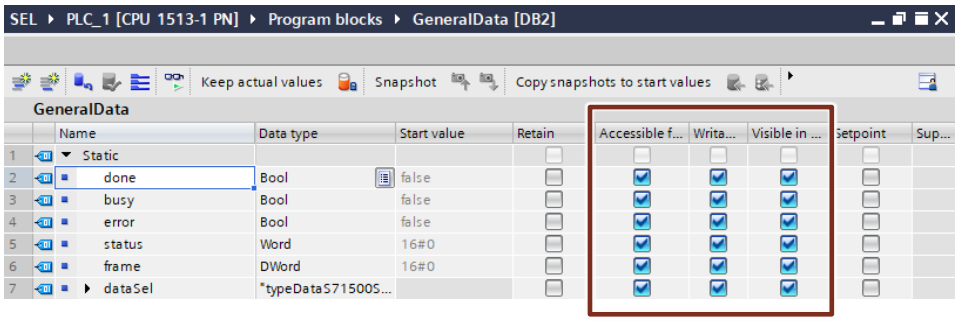


Table 2-4

Name	Data type	Planned connection at FB
done	Bool	Output "done"
busy	Bool	Output "busy"
Error	Bool	Output "error"
status	Word	Output "status"
frame	DWord	Output "frame"
dataSel	typeDataS71500SEL	Output "dataSel"

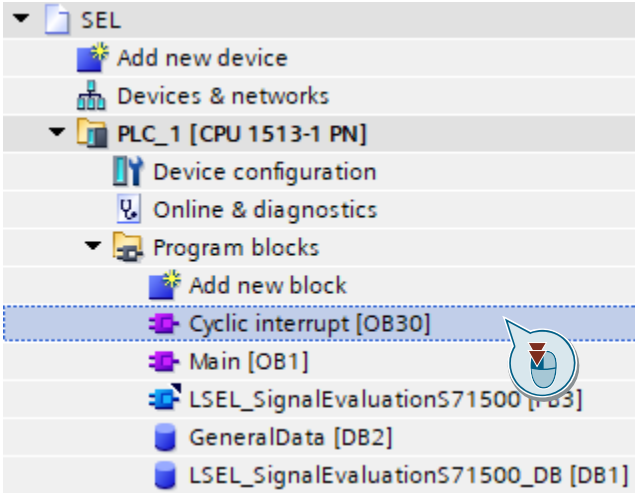
Make sure that tag access from the HMI is allowed. Enable access permissions to the tags in the columns

- "Accessible from HMI/OPC UA/Web API",
- "Writable from HMI" and
- "Visible in HMI engineering".



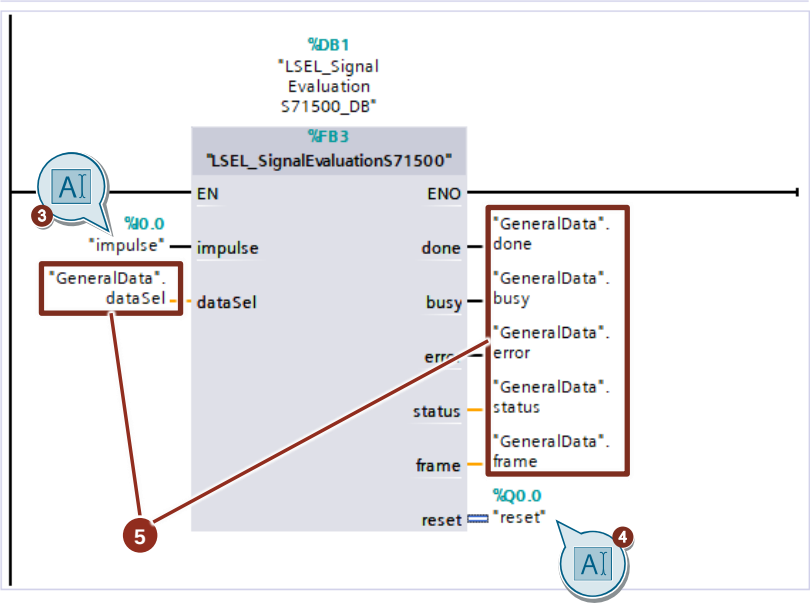
2.4.7 Connect global data block tags

1. In the Project tree, open the "Program blocks" folder for your S7 CPU.
2. Double-click the cyclic interrupt OB to open the corresponding program editor.



3. Assign the PLC variable that refers to the address of the digital input via which the diagnostic interface "COM" is read in to the "impulse" input (see chapter 2.3.2).
4. Assign to the "reset" output the PLC tag that refers to the address of the digital output. This is the digital output via which the RESET input of the SEL1200 SEL1400 is controlled.
5. Assign the remaining outputs of the FB with the tags that you created in the global data block (see chapter 2.4.6).

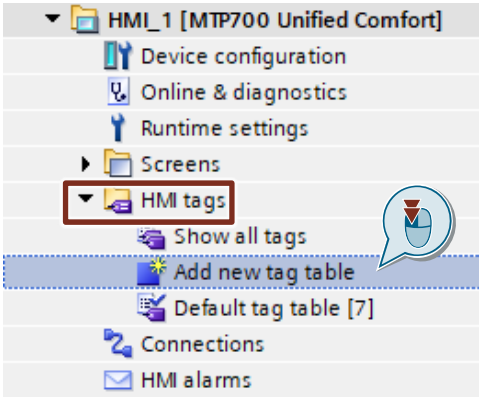
Figure 2-9



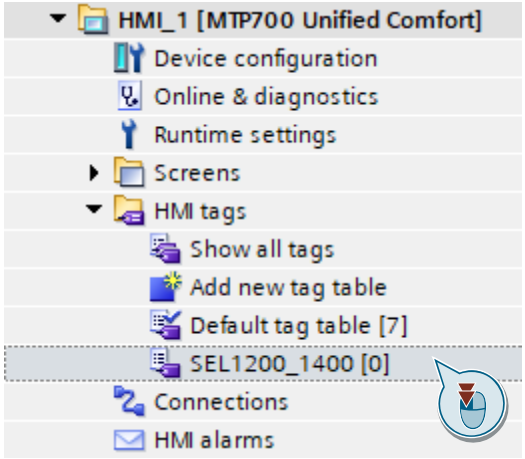
2.5 Integrating the faceplates

2.5.1 Create HMI tags

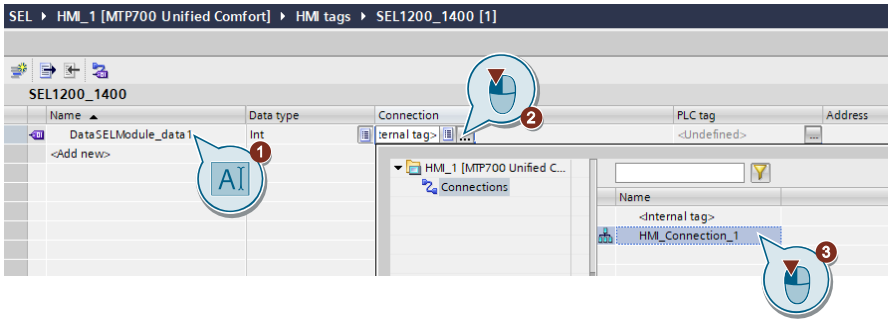
1. In the "Project tree", navigate to the device folder of the HMI operator device.
2. Open the "HMI tags" folder and double-click the "Add new tag table" command to create a new HMI tag table.



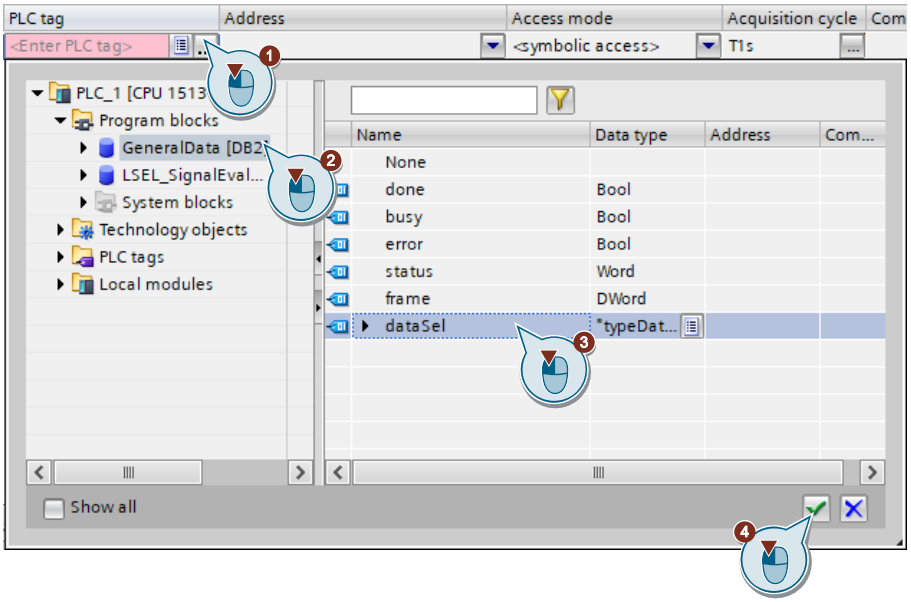
3. Give the tag table the name "SEL1200_1400" and double-click on the tag table to open it.



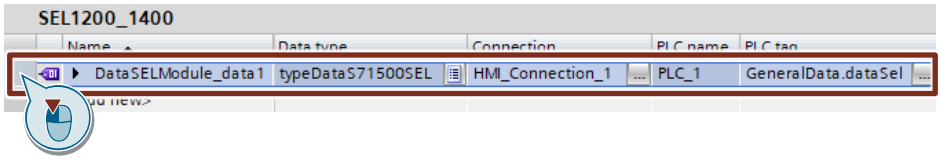
4. Create a tag called "DataSELModule_data1" and, in the "Connection" column, select the HMI connection you created in chapter 2.3.1.



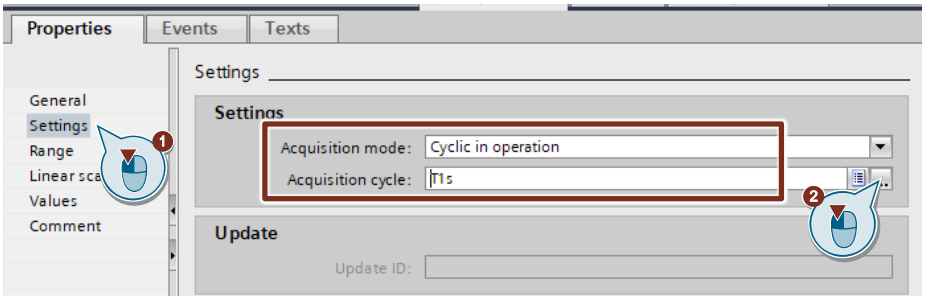
5. In the global data block "GeneralData" from chapter 2.4.6, select the tag called "dataSel" in the "PLC tag" column.



6. Select the tag "DataSELModule_data1" in the tag table. The properties of the variable are displayed in the Inspector window.

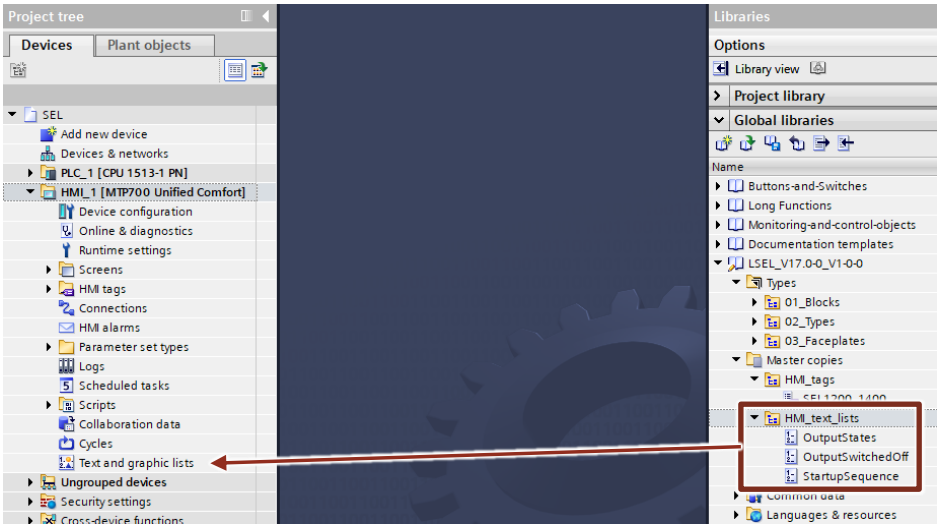


7. In the "General" tab, navigate to "Settings". Select the following settings:
   - "Acquisition cycle": T1 s



2.5.2 Copy text lists into the user project

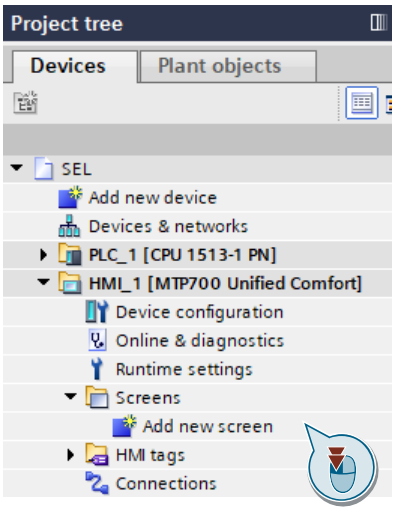
1. In the "LSEL_V17.0-0_V1-0-0" library, open the folder "Master copies > HMI_text_lists". There you will find text lists for text outputs in the faceplates.
   - OutputStates : Text list with status information on tags "DataSELModule_data1.stateOutput[1-8]" (see Table 1-3)
   - OutputSwitchedOff: Text list with status information on tags "DataSELModule_data1.reasonOutputSwitchedOff[1-8]" (see Table 1-7)
   - StartupSequence : Text list with status information on tags "DataSELModule_data1.startup" (see Table 1-8)
2. Drag and drop to copy the folder "Master copies > HMI_text_lists" from the library and into "Text and graphic lists" in the HMI folder in the project tree.



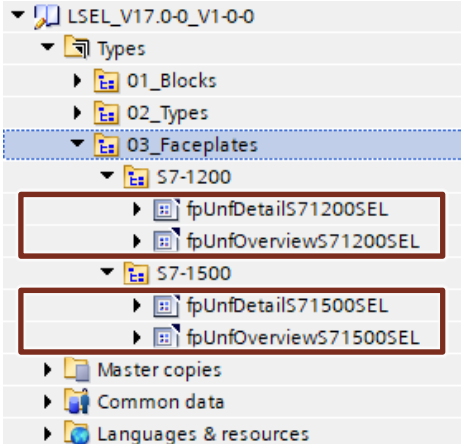
2.5.3 Copy faceplates into the user project

1. In the "Project tree", navigate to the "Screens" folder under the HMI.
2. Create a new screen or double-click on an existing screen where you'd like to integrate the faceplate for displaying the SITOP SEL1200 / SEL1400 device data.

   The screen will open.

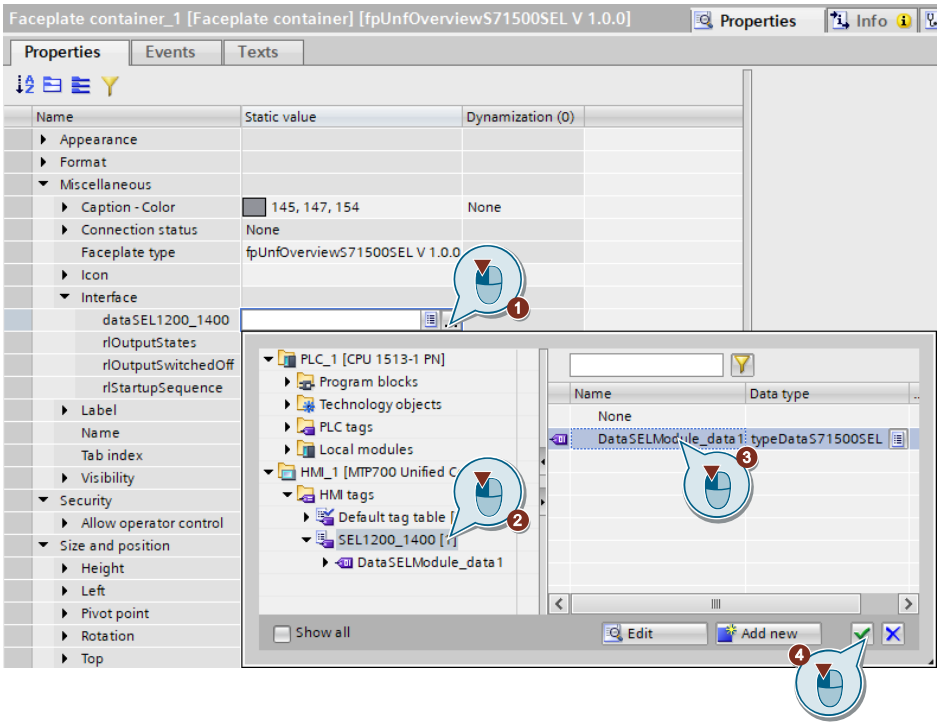


3. In the library "LSEL_V17.0-0_V1-0-0", open the folder "Types > 03_Faceplates". There you can find the faceplates for the S7-1200 CPUs and S7-1500 CPUs.
   - fpUnfDetailS71200SEL: Faceplate for communication with S7-1200 CPUs to graphically display device data as well as output voltage and current
   - fpUnfOverviewS71200SEL: Faceplate for communication with S7-1200 CPUs shows an overview of the most important device data
   - fpUnfDetailS71500SEL: Faceplate for communication with S7-1500 CPUs to graphically display device data, output voltage and current
   - fpUnfOverviewS71500SEL: Faceplate for communication with S7-1500 CPUs shows an overview of the most important device data



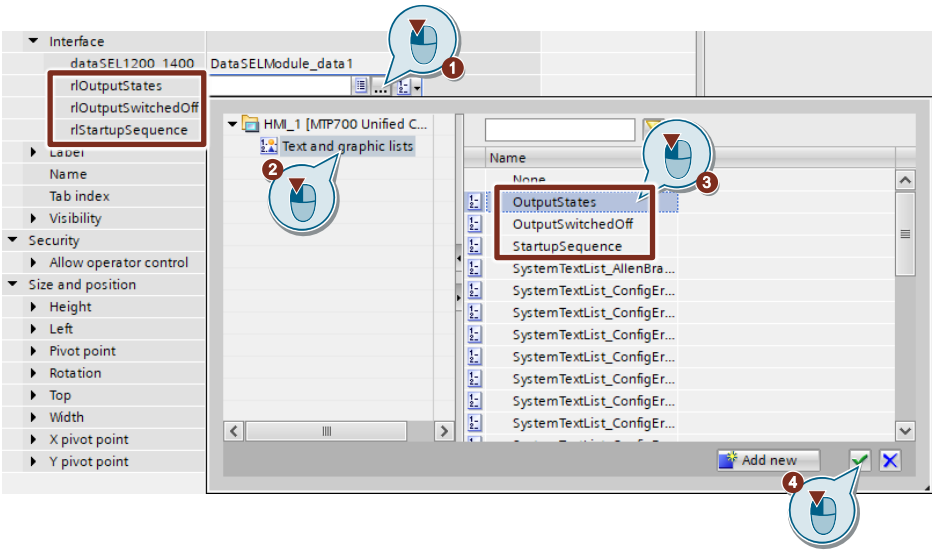
4. Add an instance of the faceplate "fpUnfOverviewS71x00SEL" or "fpUnfDetailS71x00SEL" into the open screen by dragging and dropping.
5. Select the faceplate in the screen and open the faceplate interface via the "Properties > Properties" tab.

6. Under "Miscellaneous > Interface", connect the property "dataSEL1200_1400" with the HMI tag "DataSELModule_data1" you created in chapter 2.5.1.



7. Connect the following properties of the faceplate interface with the text lists for the HMI (chapter 2.5.2).

- "rlOutputStates" -> "OutputStates"
- "rlOutputSwitchedOff" -> "OutputSwitchedOff"
- "rlStartupSequence" -> "StartupSequence"

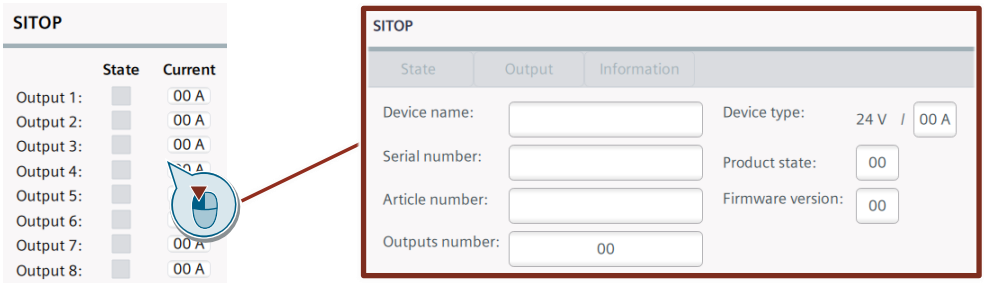


Note

If the faceplate "fpUnfOverviewS7x00SEL" is running in a WinCC Unified runtime environment, then the faceplate "fpUnfDetailS7x00SEL" will appear dynamically when the faceplate is clicked.

You can also insert the faceplate "fpUnfDetailS7x00SEL" directly into a screen in your HMI. The interface would then be connected in the same manner as with the faceplate "fpUnfOverviewS7x00SEL".

Figure 2-10

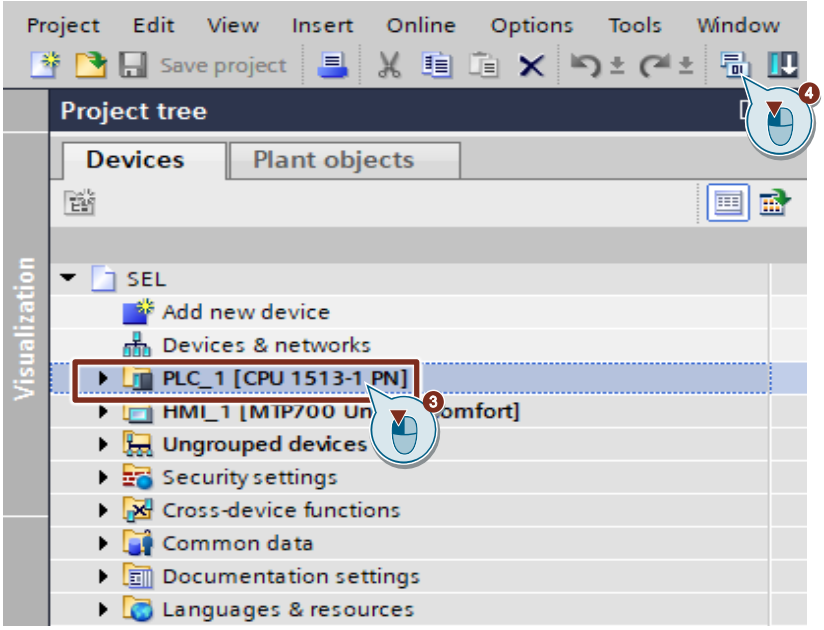


2.6 Compiling and downloading

2.6.1 User program of the S7 CPU

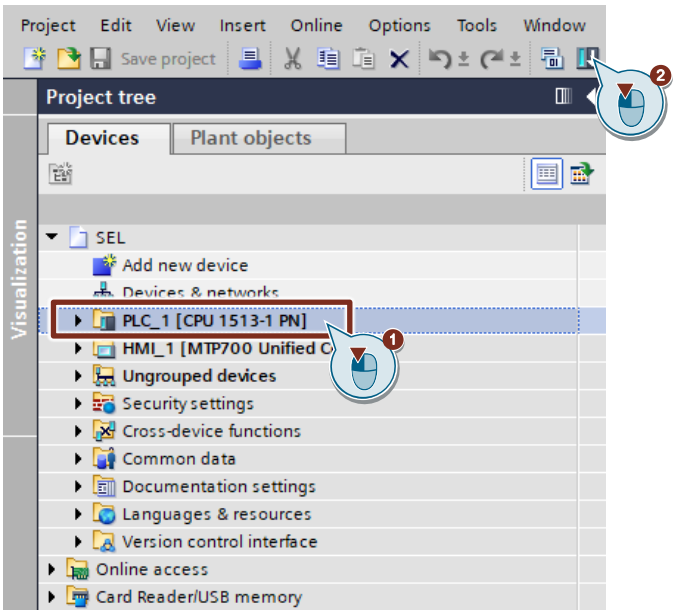
Compile

1. Make sure that your engineering PC and your S7 CPU are in the same subnet.
2. On the S7 CPU display, set the IP address and subnet mask which you entered in the hardware configuration.
3. Select the S7 CPU in the "Project tree".
4. Click on the "Compile" button in the function bar.



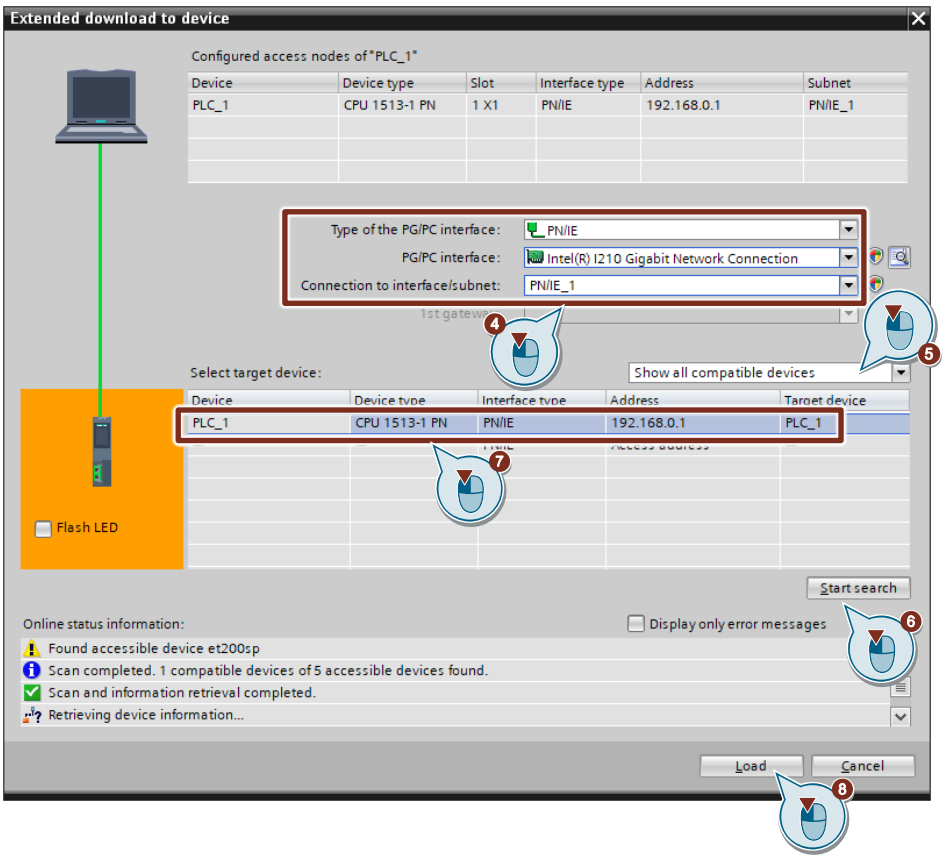
Downloading

1. Select the S7 CPU in the "Project tree".
2. Click on the "Download to device" button in the function bar to load the hardware configuration and the software into the S7 CPU.
3. The "Extended download to device" or "Load preview" dialog opens automatically.

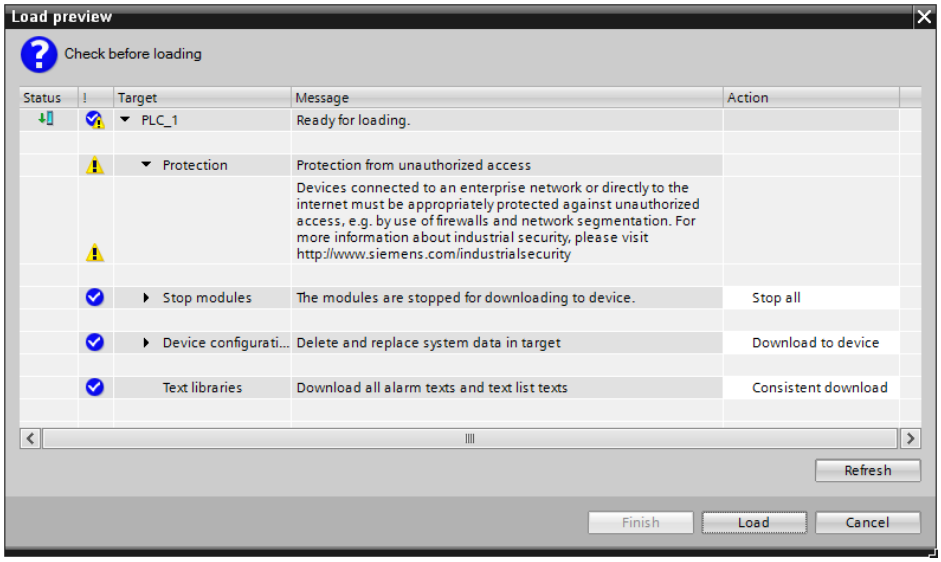


Note
The "Extended download to device" dialog is only opened automatically if the access path from the PG/PC to the S7 CPU has to be reset.

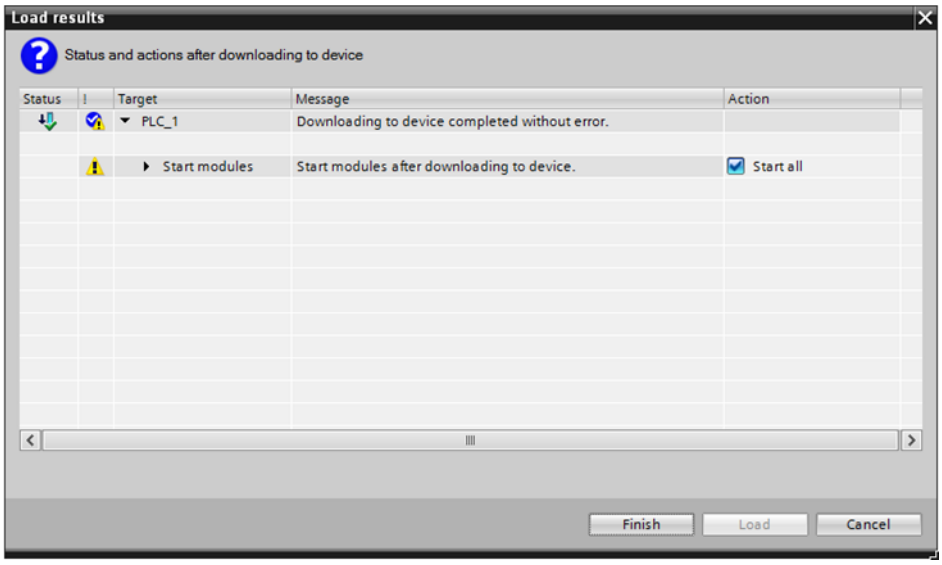
4. In the "Extended download to device" dialog, make the following settings to access the S7 CPU via TCP/IP:
   - Type of PG/PC interface: PN/IE
   - PG/PC interface: PG/PC network adapter:
   - Connection to interface/subnet: Subnet of the S7 CPU, e.g. PN/IE_1
5. Select the "Show all compatible devices" option.
6. Click the "Start search" button.
7. Select the S7 CPU as the target device.
8. Click the "Load" button



9. In the "Load preview" dialog, click the "Load" button to start the load process.



10. In the "Load results" dialog, click the "Finish" button to finish loading the results.



2.6.2 HMI operator panel

Download the configuration to your HMI Operator Panel or start the simulation.

Note

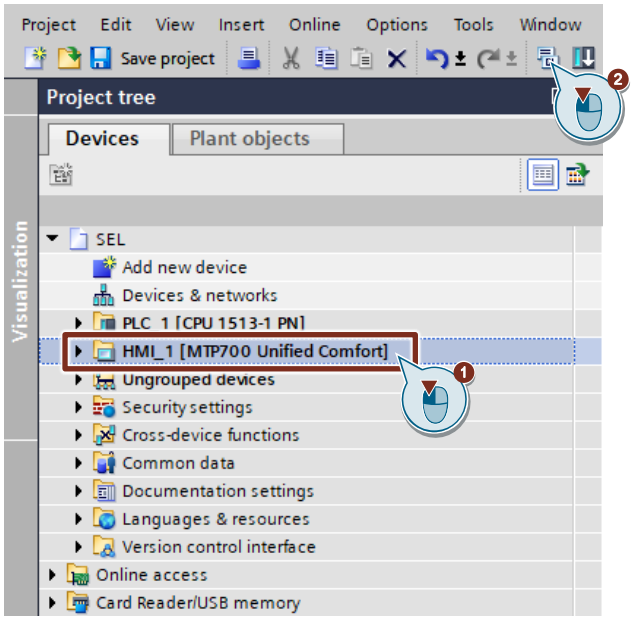
If you only simulate the device, make sure that the PG/PC interface is set correctly.

For more on this topic, read the FAQ "Why is communication between the Runtime simulation and the S7-1200/S7-1500 not possible if the PG/PC interface is not set correctly?" You can find this FAQ at the following link:

https://support.industry.siemens.com/cs/ww/en/view/38717202

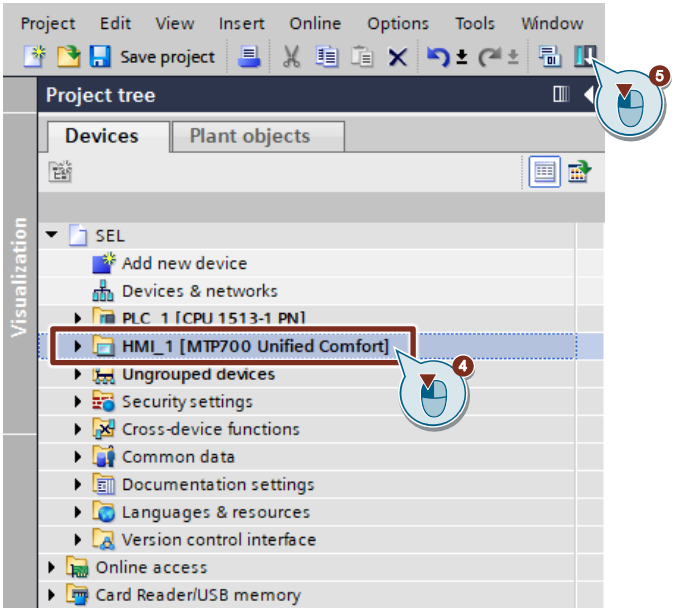
Compile

1. Select the HMI Operator Panel in the project tree.
2. Click on the "Compile" button in the function bar.



Downloading

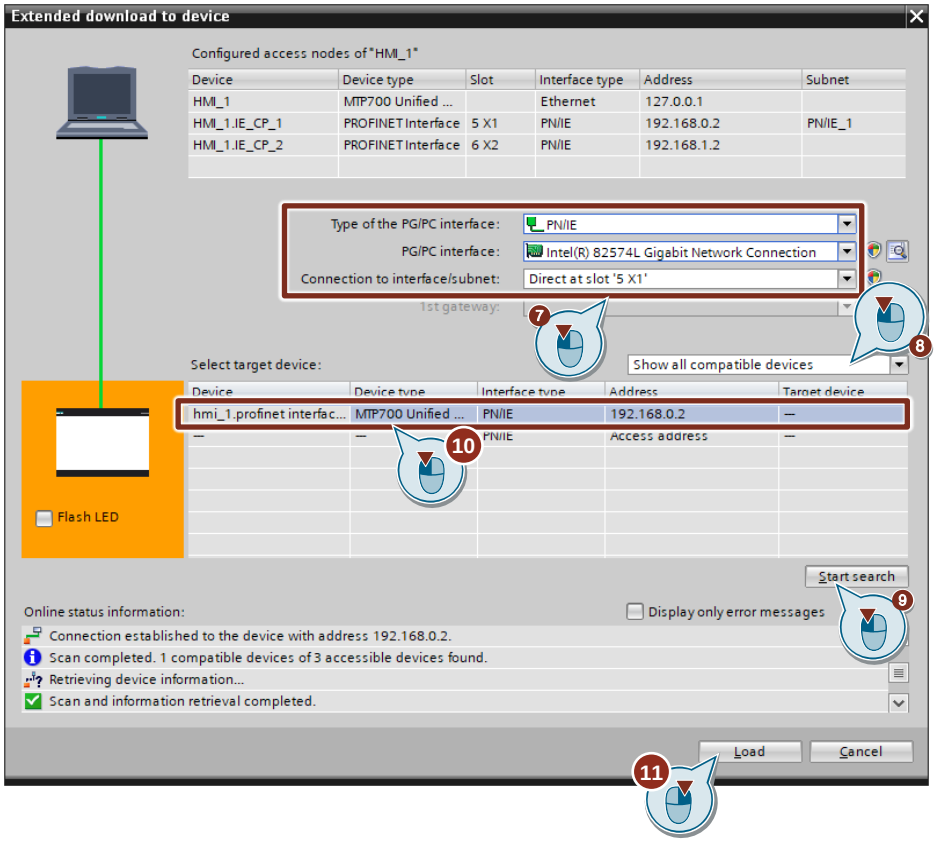
1. Ensure that your engineering PC and the HMI operator device are connected to the same subnet.
2. On the HMI operator device in the menu "Network and Internet > Network settings > PN-X1", set the IP address and subnet mask that you entered in the hardware configuration.
3. On the HMI device in the menu "Service and Commissioning > Transfer", enable transfer mode with "Enable transfer".
4. Select the HMI in the "Project tree" in TIA Portal.
5. Click on the "Download to device" button in the function bar to load the configuration into the HMI device.
6. The "Extended download to device" or "Load preview" dialog opens automatically.



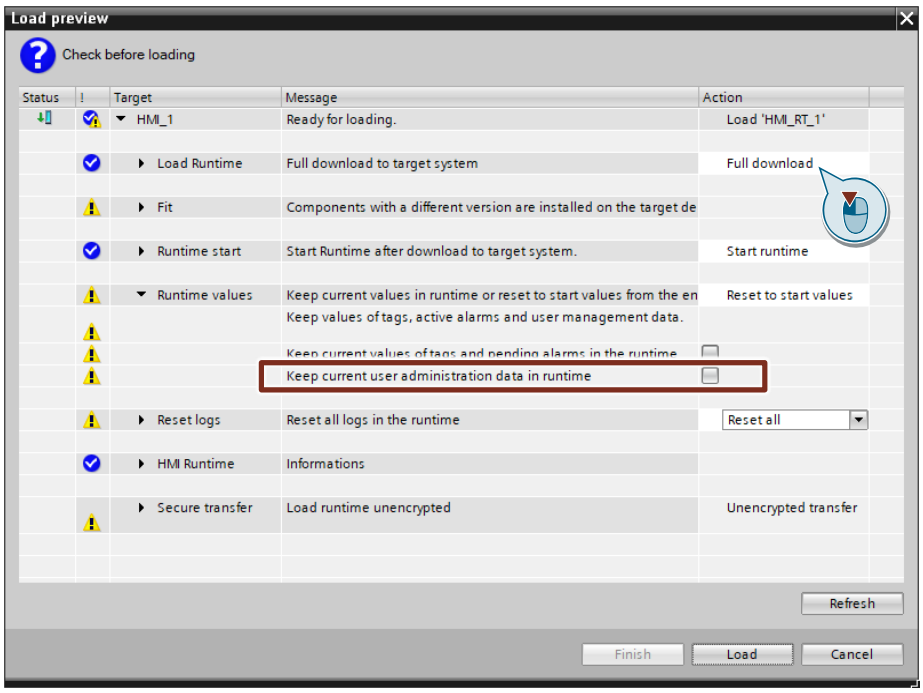
Note

The "Extended download to device" dialog is only opened automatically if the access path from the PG/PC to the HMI Operator Panel has to be reset.

7. In the "Extended download to device" dialog, make the following settings to access the HMI Operator Panel via TCP/IP:
   - Type of PG/PC interface: PN/IE
   - PG/PC interface: PG/PC network adapter:
   - Connection to interface/subnet: Subnet of the HMI, e.g. PN/IE_1
8. Select the "Show all compatible devices" option.
9. Click the "Start search" button.
10. Select the HMI device as the target device.
11. Click the "Load" button



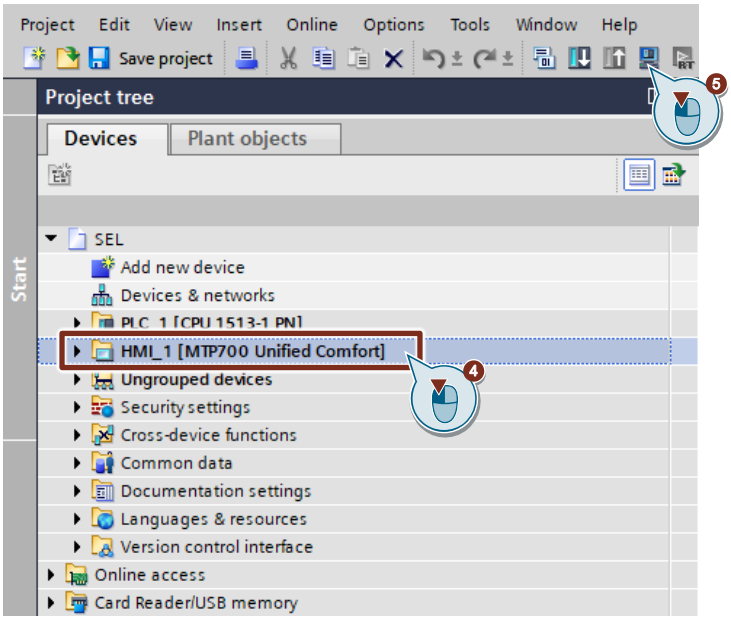
12. In the "Load preview" dialog, select the "Full download" action under "Load Runtime". Under "Runtime values", disable the action "Keep current user administration data in runtime". Then click the "Load" button to start the download process.



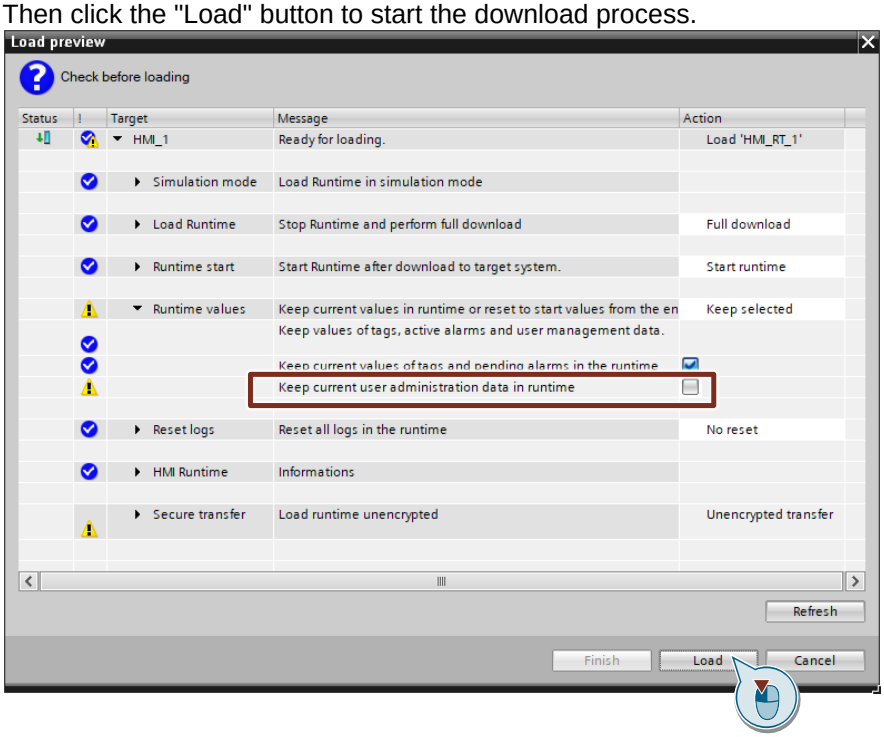
13. The runtime will launch automatically on the HMI operator device.

Start simulation

1. Make sure that your engineering PC and the S7 CPU are connected to the same subnet.
2. Open the "Control Panel" of the Engineering PC.
3. Under "Set PG/PC Interface (32-bit)", select the network card via which the visualization is to communicate with the S7 CPU.
4. Select the HMI operator device in the project tree.
5. In the function bar, click on the "Start simulation" button.



6. Under "Runtime values" in the "Load preview" dialog, select the action "Keep current user administration data in runtime" and uncheck the checkbox.
   Then click the "Load" button to start the download process.



7. The runtime simulation will start.

3 Operation

3.1 Faceplate "fpComAdvOverviewS71500SEL" and "fpComAdvOverviewS71200SEL"

3.1.1 Overview

Figure 3-1

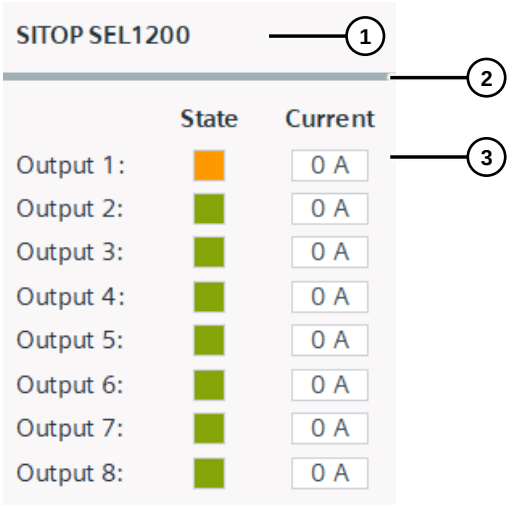


Table 3-1

No.	Area	Description
1	Header range	Displays "SITOP + <Device name>" as header
2	Status area	Status line for colored display of the current communication status You can find detailed information on the status area in the chapter 3.2.3.
3	Information area	Area for displaying the most important device data: • Color status of the outputs ("State"): see Table 3-6 • Output currents of the outputs ("Current")

The faceplates "fpComAdvOverviewS71500SEL" and "fpComAdvOverviewS71200SEL" represent an overview of the most important device data.

Click on the faceplate to display further device data and output voltage and output current curves in the faceplate "fpComAdvDetailS71500SEL" or "fpComAdvDetailS71200SEL".

3.2 Faceplate "fpUnvDetailS71200SEL" and "fpUnvDetailS71500SEL"

3.2.1 Overview

Figure 3-2

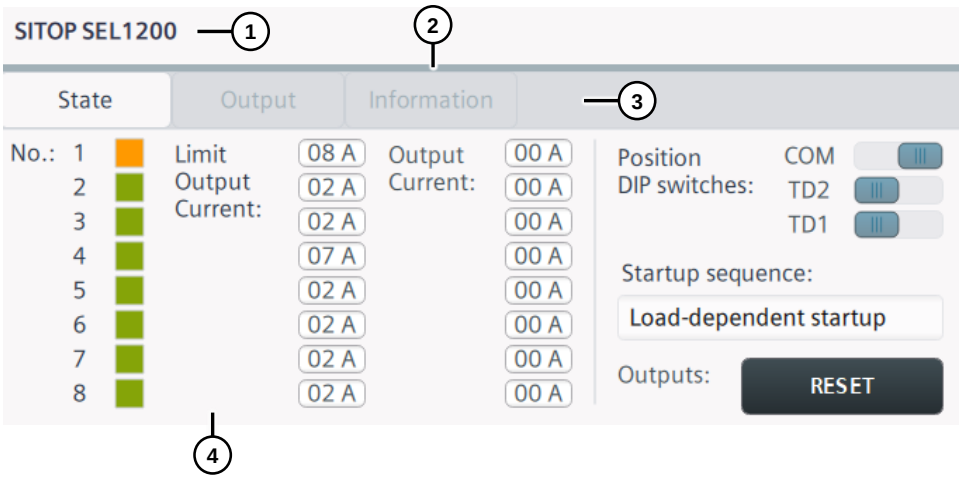


Table 3-2

No.	Area	Description
1	Header range	Displays "SITOP + <Device name>" as header
2	Status area	Status line for colored display of the current communication status
3	Navigation pane	Navigation between the four addresses • Status: Device data with status information • Outputs: Device data of the various outputs • Information: General device information • Trends: Curve displays of the current values of the outputs
4	Information area	Area to display the selected device information in the navigation pane

3.2.2 Header range

In the heading area "SITOP + <device name>" is displayed as the header of the faceplate. If more than one faceplate is used, you know immediately by the device name in the header which device information is shown.

3.2.3 Status area

The status area shows the status of the communication via the diagnostic interface "COM" of the SITOP SEL1200 / SEL1400.

The Table below describes the color states in the status area.

Table 3-3

Status	Description	Status bar		
		Color (R, G, B) Background	Color (R, G, B) Frame	Flashing
Status Communication	OK	161, 176, 183	161, 176, 183	No
	Not OK	202, 51, 51	202, 51, 51	No

3.2.4 Navigation pane

The device data of the SITOP SEL1200 / SEL1400 are divided into four different subject areas via the navigation area.

- Status: Parameters for the status of the device
- Outputs: Output parameters
- Information: Informative device information

Use the buttons to switch between the topic areas. Depending on the button selected, the device information displayed in the information area changes.

The color of the button indicates which topic area was selected.

Table 3-4

Active topic area	Inactive topic area
Status	Status

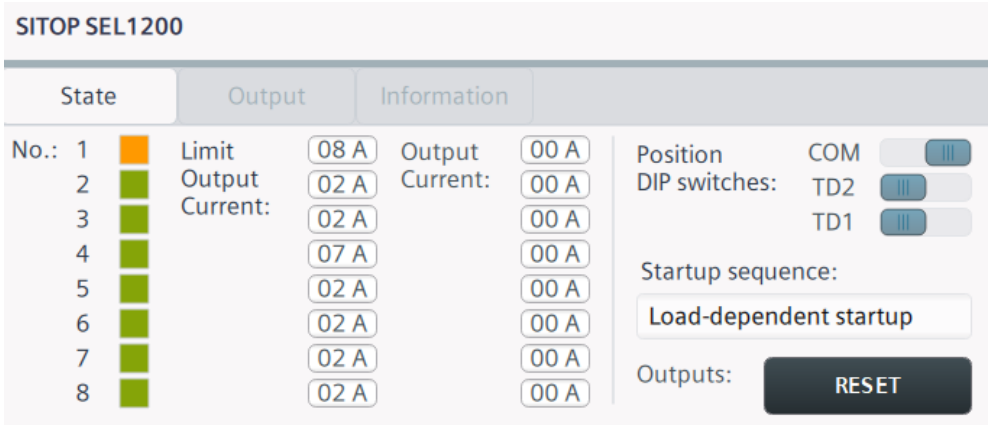
3.2.5 Information area

The information area clearly displays all device data of the SITOP SEL1200 / SEL1400 via status displays of the switches (rectangles), I/O fields and curve displays. Depending on the topic area, these objects are used in different ways.

Status

The "State" information area displays the status parameters of the SITOP SEL1200 / SEL1400.

Figure 3-3



The following status parameters are displayed:

- Color status of the outputs: see Table 3-6
- Current limit value of the outputs
- DIP switch position
  - COM
  - TD2
  - TD1
- Start-up sequence (Table 3-5)

The "StartupSequence" text list (Table 3-5) contains texts for the start-up sequence that you can adjust with the DIP switches "TD1" and "TD2". Depending on the state of the "startup" tag, the associated text will be displayed via a symbolic I/O field.

Table 3-5

Status value Tag	Text
0	Load-dependent ramp-up ("Load-dependent startup")
1	Time delay acceleration 25 ms ("Delay startup 25 ms")
2	Time delay acceleration 200 ms ("Delay startup 200 ms")
3	Time delay ramp-up 500 ms ("Delay startup 500 ms")

The status of an output is indicated by a colored display with animation. The background color will vary depending on the state value of the tag "stateOutput<x>" and a "flashing" animation will be executed.

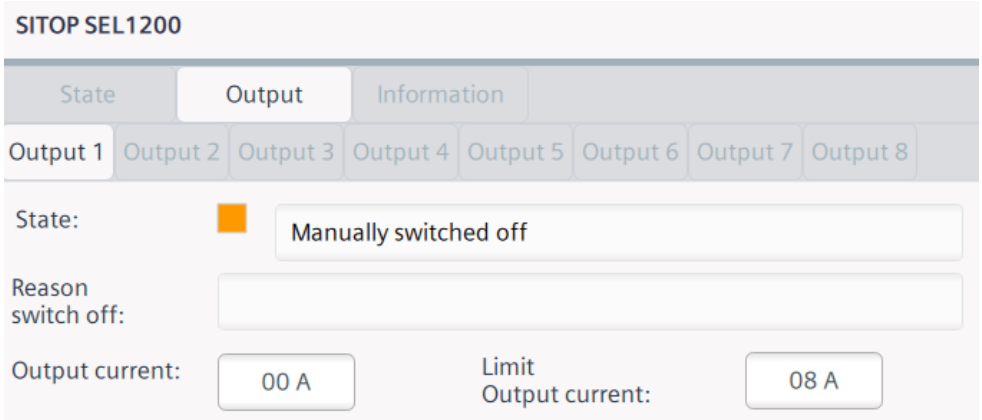
Table 3-6

Status value Tag	Status		
	Color (R, G, B) Background	Color (R, G, B) Frame	Flashing
0	202, 51, 51	204, 209, 215	No
1	202, 51, 51	204, 209, 215	Yes
2	255, 153, 0	204, 209, 215	Yes
3	133, 164, 8	204, 209, 215	No
4	218, 220, 224	204, 209, 215	No
5	202, 51, 51	204, 209, 215	No
6	202, 51, 51	204, 209, 215	No
7	133, 164, 8	204, 209, 215	Yes
…	218, 220, 224	204, 209, 215	No

Outputs

The information area "Output" shows the parameters of the selected output of the SITOP SEL1x00. The selection is made via the corresponding "Output <x>" button, where <x> is the output number.

Figure 3-4



The following output parameters are displayed:

- Color and text status of the output ("State"): see Table 3-6 and Table 3-7
- "Reason switch off": see Table 3-8
- "Output current"
- Current limit of the output ("Limit Output current")

The text list "OutputStates" contains the possible states of an output. Depending on the state of the tag "stateOutput<x>", the associated status text will be displayed via a symbolic I/O field.

Table 3-7

Status value Tag	Text
0	Automatically switched off, reset not possible
1	Automatically switched off, reset possible
2	Manually switched off
3	Switched on
4	Broken
5	Device overtemperature, output switched off
6	I_{SUM} too high
7	Isum > Iset

The text list "OutputSwichedOff" contains the possible shutdown reasons. Depending on the state of the "reasonOutputSwitchedOff<x>" tag, the associated reason for shutdown will be displayed via a symbolic I/O field.

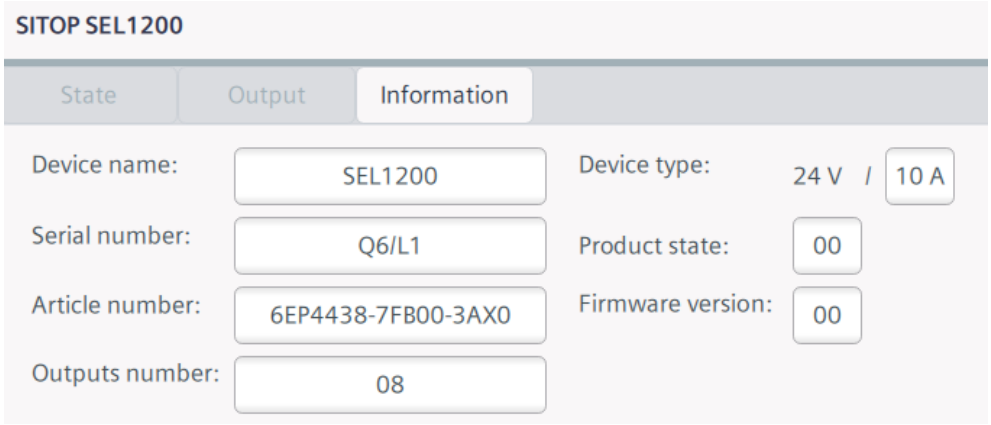
Table 3-8

Status value Tag	Text
0	
1	$I_{OUT} > I_{SET}$
2	$I_{OUT} > 1{,}5x\ I_{SET}$ ("Iout > 1.5x Iset")
3	$I_{SUM} > 60$ A
4	$U_{IN} < 19.4$ V und I_{OUT} > [IOUT] ("Uin < 19.4 V and Iout > Iset")
5	$U_{IN} < 19.4$ V ("$U_{IN} < 19.4$ V")
6	$U_{IN} < 15$ V
7	$U_{IN} > 30$ V
8	device overtemperature ("Device overtemperature")

Information

The information area labeled "Information" displays static device data of the SITOP SEL1x00.

Figure 3-5



You will see the following device information:

- Device name
- Serial number
- Item number
- Number of outputs
- Device type
- Product version
- Firmware version

4 Troubleshooting

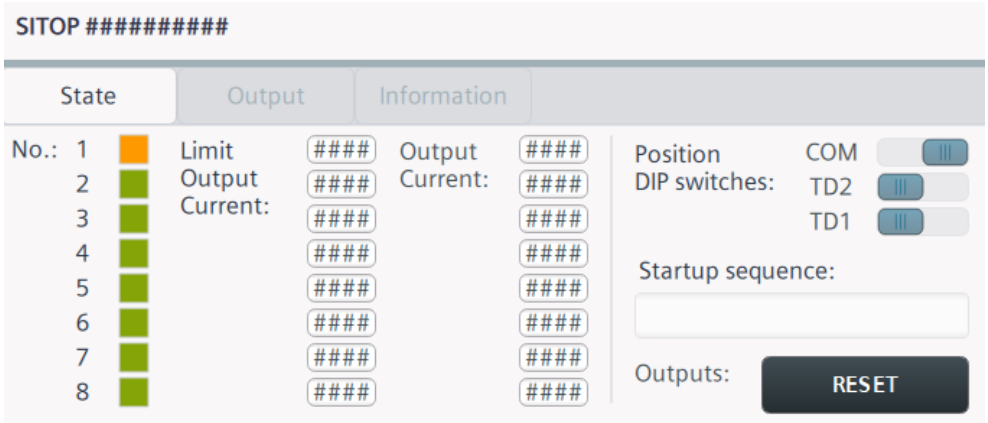
4.1 FB "LSEL_SignalEvaluationS71500" and FB "LSEL_SignalEvaluationS71200" status display

Table 4-1

Value at output "status"	Meaning	Help/Note
16#8001	No signal change was detected at input "impulse" for at least 6 seconds.	• Check whether the diagnostic interface "COM" is connected to the digital input. • Check whether you indicated the right digital input on the "pulses" input. • Check whether the input voltage is connected to the SEL1x00.
16#8002	Cycle time of 10 ms exceeded	Call the function block with a maximum of 10 ms.
16#8003	Error when evaluating the telegram content	High level and low level could not be properly detected so that an error occurred when evaluating the telegram content.
16#8004	Length of the telegram is outside the value range	Value range: 3275 ms to 3625 ms
16#8005	Device type not detected	Permissible device type: SEL1x00
16#8006	Telegram unknown	Permissible content type: 0 to 3
16#8007	Communication error or device replacement	Article number change detected

4.2 Hashes ("#####") appear in the faceplate

Figure 4-1



If hashes ("#####") are displayed in the faceplate for device data, there is a communication problem between the HMI operator device and the S7 CPU.

Check the following items:

- Check the connection cables for proper wiring and damage.
- With WinCC Advanced / Unified PC, check whether the PG/PC interface is set correctly. If the PG/PC interface is set incorrectly, communication between the runtime simulation and the S7-1200 / S7-1500 is not possible (see FAQ 38717202). You can find the settings under "Control Panel > Set PG/PC interface".
- Check whether the devices are in the same network.

Check if the IP address of a device is blocked in the network router.

5 Appendix

5.1 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: 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

SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:
www.siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:
support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android:
support.industry.siemens.com/cs/ww/en/sc/2067

5.2 Industry Mall

The Siemens Industry Mall is the platform on which the entire siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing processing – directly and independently of time and location:
mall.industry.siemens.com

5.3 Links and literature

Table 5-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the article page of this application example https://support.industry.siemens.com/cs/ww/en/view/109763709
\3\	SIMATIC STEP 7 Basic/Professional V17 and SIMATIC WinCC V17 https://support.industry.siemens.com/cs/ww/en/view/109798671

5.4 Change documentation

Table 5-2

Version	Date	Modifications
V1.0	02/2022	First version