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Communication blocks and Faceplates for SITOP SEL1200 / SEL1400

SITOP SEL1200 / SEL1400
SIMATIC STEP 7 Basic / Professional V15
SIMATIC WinCC Comfort / Advanced V15

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1 Introduction

1.1 Overview

The library "LSEL_V15.0-0_V1_0_0" provides function blocks and faceplates for the SITOP SEL1200 and SEL1400. You use the function blocks to read the device data of the selectivity module. You can use the faceplates to clearly display the device data on an HMI operating device.

The prefabricated function blocks and faceplates 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 in 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 S7-1500

The following figure shows the connection of the SEL1200 and SEL1400 to a digital input module (DI) and digital output module (DO) of the S7-1500.

Figure 1-1

1. Power Supply (PS)

2. S7-1500 CPU with function block (FB)

3. Digital input module/ Digital output module (DI / DO)

4. Diagnostics interface "COM"

5. RESET input

6. Output 1 to 8 24 V DC

7. Input 24 V DC

8. GND

🟩 PROFINET / IE

🟥 +24V DC

🟦 0V

🟧 Signal of the diagnostic interface "COM".

⬛ Signal for RESET
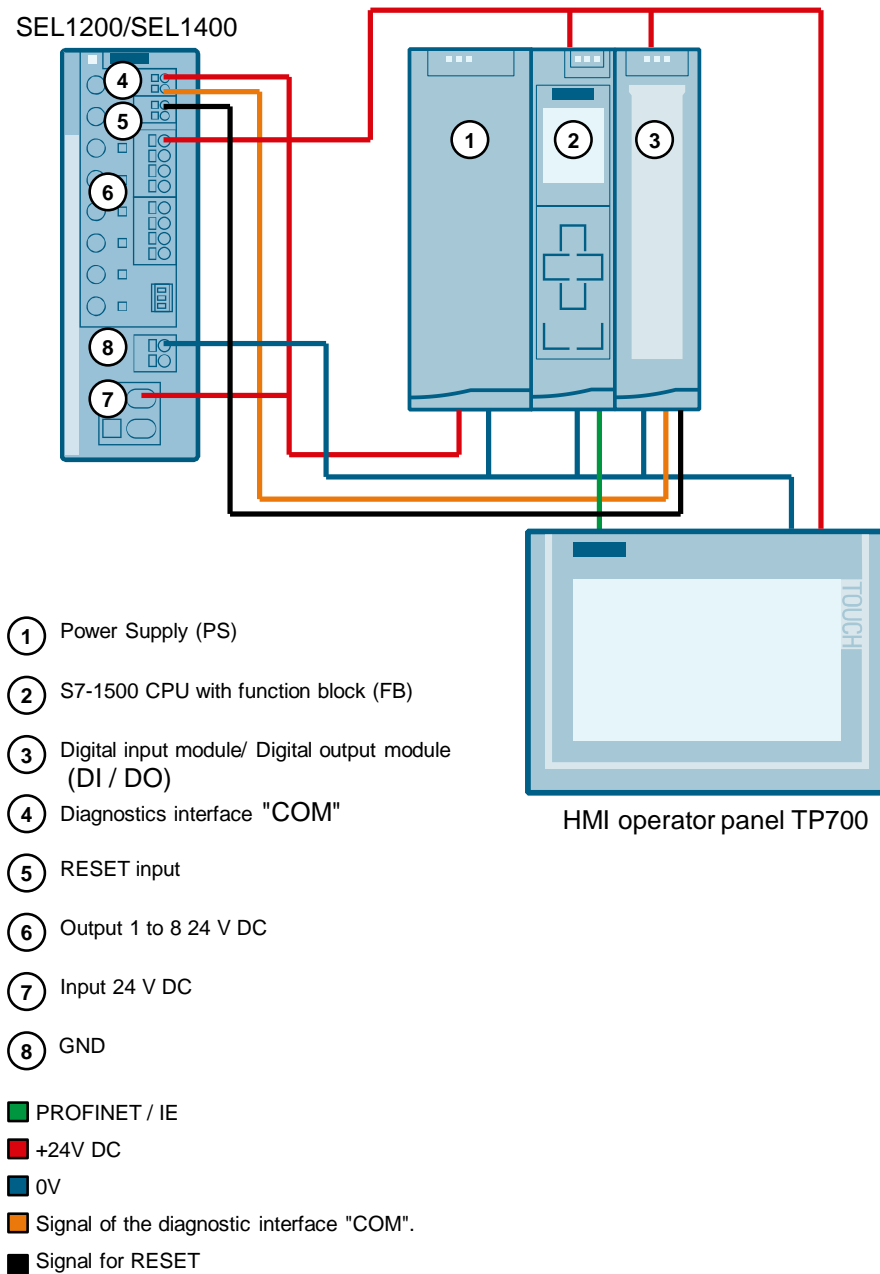
1.2.2 Application with S7-1200

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

Figure 1-2

1. Power Supply (PS)

2. S7-1200 CPU with function block (FB)

3. Diagnostic interface "COM"

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 of the diagnostic interface "COM".

■ Signal for RESET

1.2.3 Application with S7-300/S7-400

The following figure shows the connection of the SEL1200 and SEL1400 to a digital input module (DI) and digital output module (DO) of the S7-300 CPU.
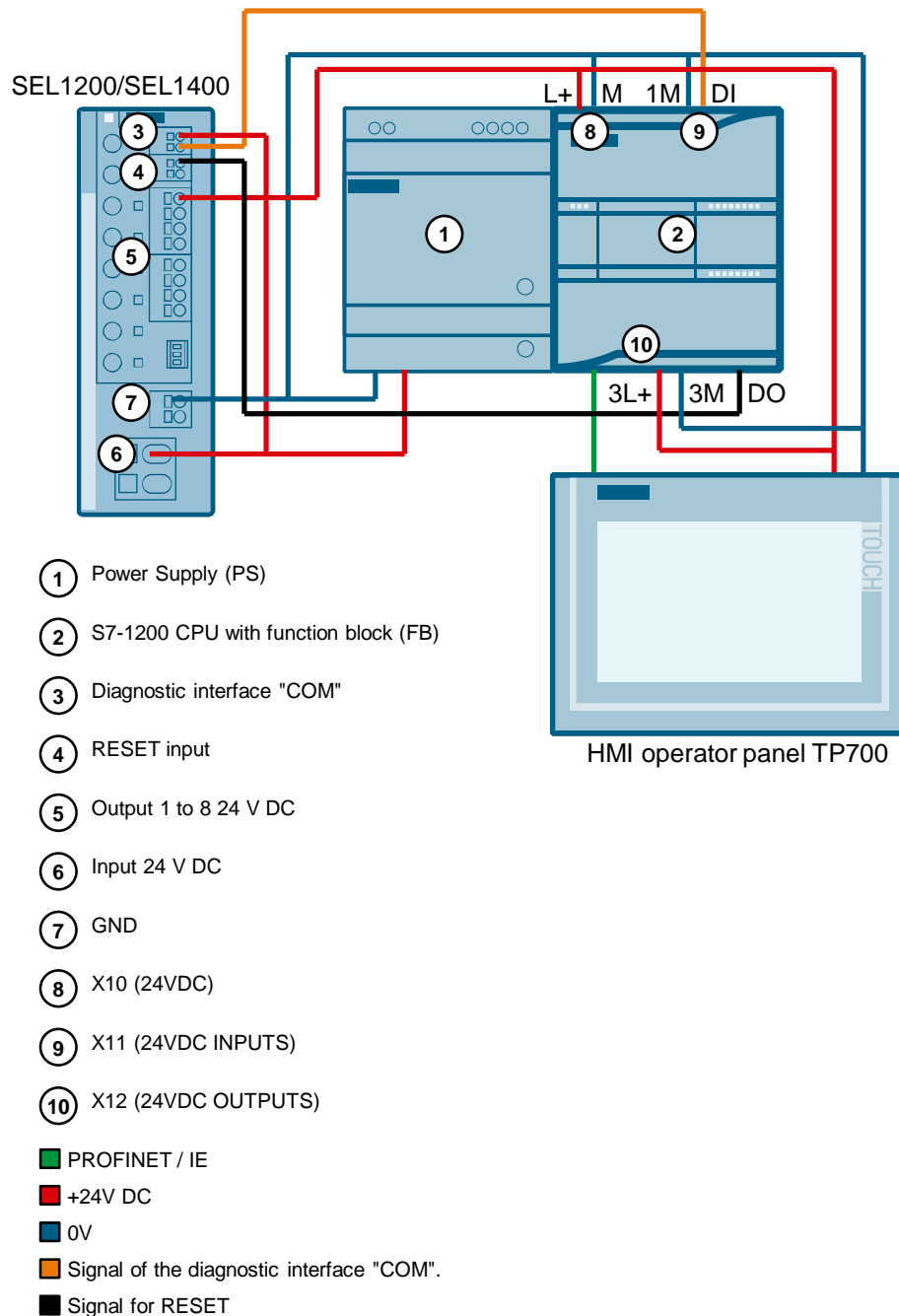
Figure 1-3

SEL1200 /SEL1400

(1) Power Supply (PS)

(2) S7-300 CPU with function block (FB)

(3) Digital input module (DI)

(4) Digital output module (DO)

(5) Diagnostic interface „COM"

(6) RESET input

(7) Output 1 to 8 24 V DC

(8) Input 24 V DC

(9) GND

HMI operator panel TP700

■ PROFINET / IE
■ +24V DC
■ 0V
■ Signal of the diagnostic interface „COM"
■ Signal for RESET
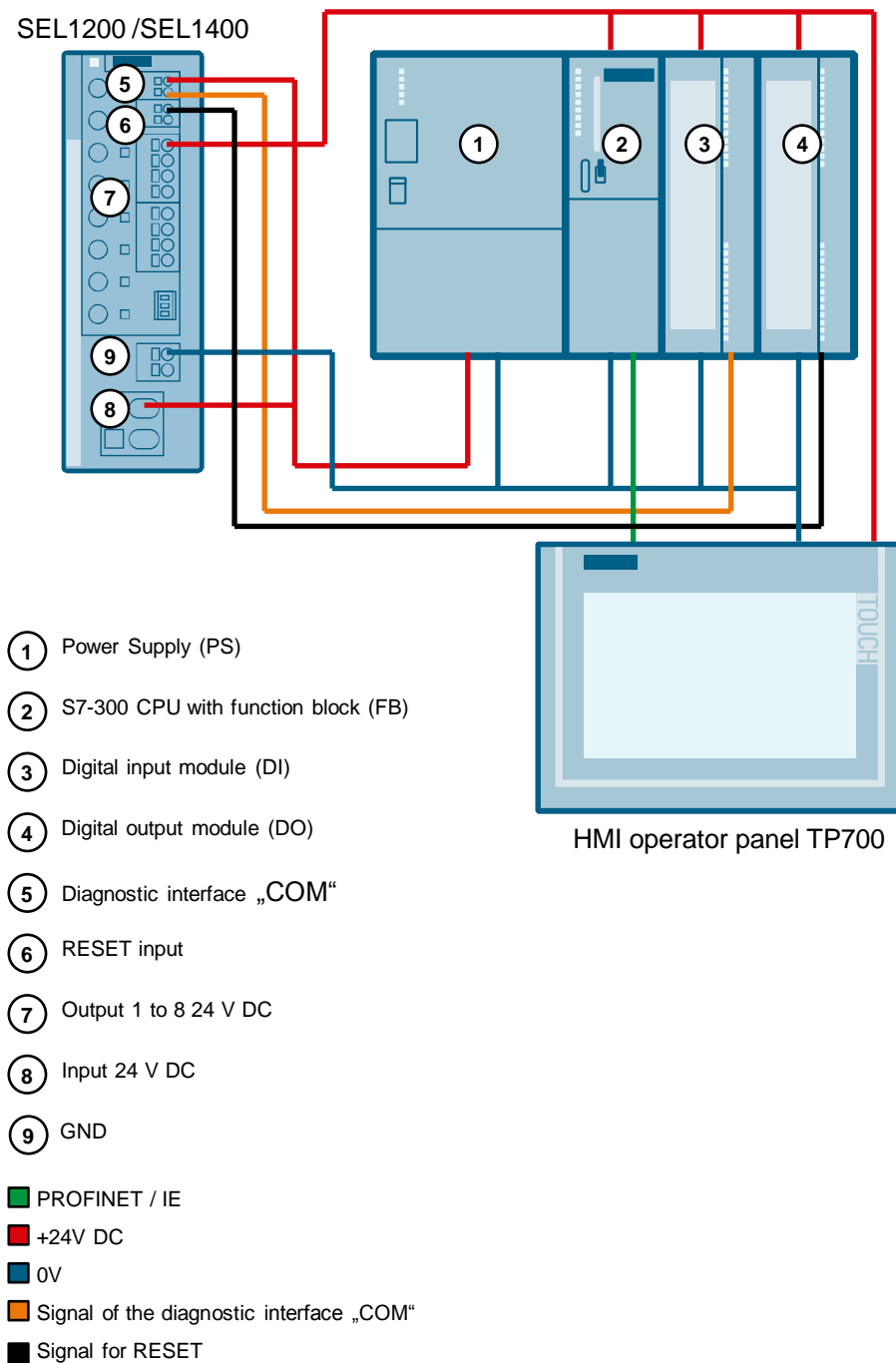
1.2.4 Effect diagram

The library provides the function block (FB) for following CPUs, respectively.

- S7-1500 CPUs
- S7-1200 CPUs
- S7-300 / S7-400 CPUs

Call up the S7-CPU in the FB user program, in order to evaluate the signal of the diagnostics interface "COM". The FB reads the "COM" diagnostics interface signal via a digital input. At its output, the 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).
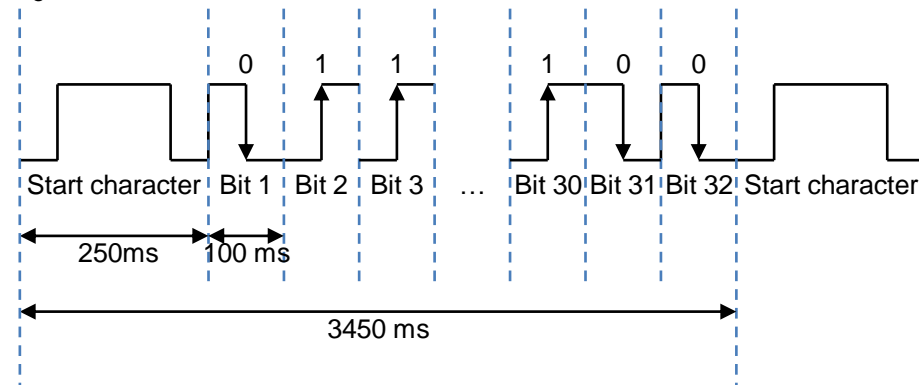
Figure 1-4
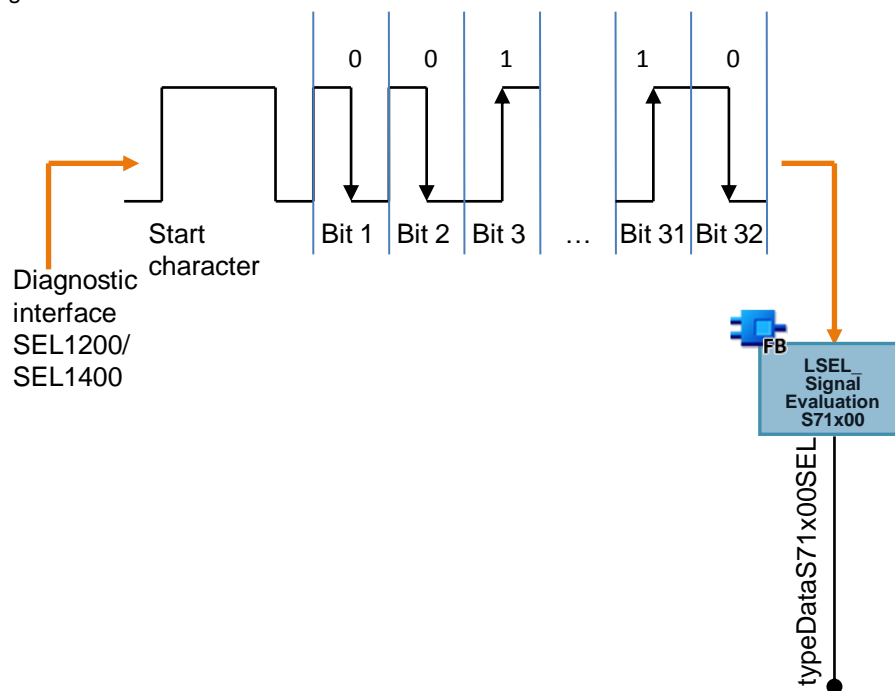
1.2.5　Signal profile

Figure 1-5 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.
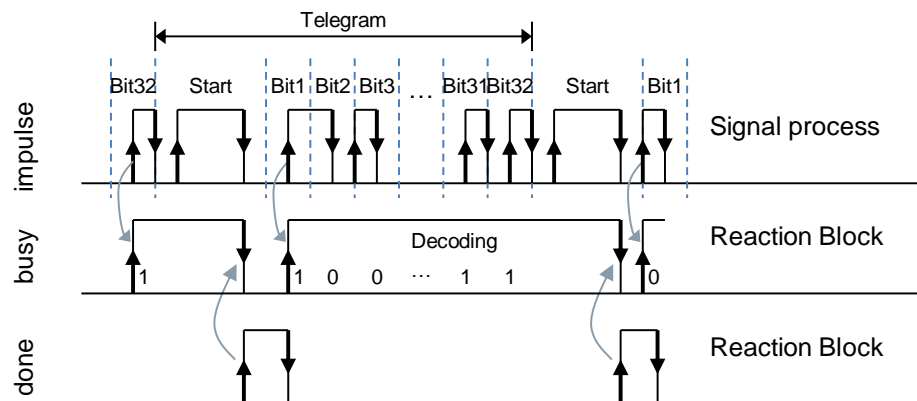
Figure 1-5

1.2.6 Function sequences of the function block

Figure 1-5 shows the graphical representation of the function sequences of the following function blocks:

- FB "LSEL_SignalEvaluationS71500"
- FB "LSEL_SignalEvaluationS71200"
- FB "LSEL_SignalEvaluationS7300"

Figure 1-6

Note	The instance DB of the FB "LSEL_SignalEvaluationS71500", FB "LSEL_SignalEvaluationS71200" and FB "LSEL_SignalEvaluationS7300" is generated when the function block is called. You need a separate instance DB for each call of the function module.

1.2.7 Internally used instructions for S7-1500 CPUs and S7-300 / S7-400 CPUs

The following instructions are used internally in the function block for S7-1500 CPUs and S7-300 / S7-400 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. In the function block the switch-on delay is used when generating the error messages.
  The TON instruction can be found in the TaskCard "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 the data type TME.

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 diagnostics interface "COM" 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".

Calculating 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 on a negative edge is subtracted from the system time stored on a positive edge.

1.2.8 Internally used instructions for S7-1200 CPUs

The following instructions are used internally in the function block for
S7-1200 CPUs:

- RD_SYS_T: With the instruction RD_SYS_T you read out the current date and
  time (module time) of the CPU clock. In the function block the time is used to
  calculate the cycle time and to determine 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. In the function block the
  switch-on delay is used when generating the error messages.
  The TON instruction can be found in the Task Card "Instructions" under "Basic
  instructions > Timer operations".

- T_DIFF: The statement 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 diagnostics interface "COM" 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 an impulse

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 the time synchronization.

1.2.9 Content of the telegrams of the SEL1200 and SEL1400

Overview

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

- Bit 1 to 6: Header
- Bit 7 to 32: Telegram useful content

The header and the status information of the PSU6200 are contained in all 4 telegrams. The following useful contents 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 1-7

Bit	1	2	3	4	5	6	7 to 32
	Header						
	Device type[1]			R[2]	Content type		telegram dependent user content
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 currents or current limit values) Output 1 to 4
Telegram 4	0	x	x	0	1	1	Current values (output currents or current limit values) Output 5 to 8

[1] Device type: SEL1400 or SEL1200
[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 $\quad$ $010_{bin} = 2_{dez}$: 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 user content of telegram 1.

Table 1-2

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-7 and Table 1-1
7	Input voltage	0: Input voltage too low or too high 1: Input voltage in permissible range
8 to 10	Status output 1	See Table 1-3
11 to 13	Status output 2	See Table 1-3
14 to 16	Status Output 3	See Table 1-3
17 to 19	Status output 4	See Table 1-3
20 to 22	Status output 5	See Table 1-3
23 to 25	Status output 6	See Table 1-3
26 to 28	Status output 7	See Table 1-3
29 to 31	Status 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 ("Automatically switched off, reset possible")	Flashes red
$010_{bin} = 2_{dez}$	Manuel switched off ("Manually switched off")	Flashes orange
$011_{bin} = 3_{dez}$	Switched on ("Switched on")	Illuminated green
$100_{bin} = 4_{dez}$:	Defect ("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 1-7 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 $10_{bin} = 2_{dez}$

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 are transmitted.

Table 1-5

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-7 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 is transmitted.

Table 1-6

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-7 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 are transmitted.

Table 1-8

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-7 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 is transmitted.

Table 1-9

Bit	Meaning	Value range (binary)
1 to 6	Header	See Figure 1-7 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 these hardware and software components.

Table 1-10

Components	Quantity	Article number	Alternatively
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 of a decentralized periphery
S7-1200			
CPU 1211C	1	6ES7211-1AE40-0XB0	Any S7-1200 CPU
S7-300			
CPU 315-2 PN/DP	1	6ES7315-2EH14-0AB0	• Anny S7-300 / S7-400 CPU • IM 151-8(F) PN/DP CPU • IM 154-8(F/FX) PN/DP CPU
DI 16x24VDC	1	6ES7321-1BH02-0AA0	Other digital input modules and digital output modules or digital inputs and digital outputs of a decentralized periphery.
HMI operator panel			
TP700 Comfort	1	6AV2124-0GC01-0AX0	All Comfort Panel ≥ 7" and PC station with WinCC RT Advanced ≥ V15 also usable
Engineering software			
STEP 7 V15	1	6ES7822-1AA05-0YA5	For the project planning of the S7-CPU you need STEP 7 Professional V15 or higher.
WinCC Engineering V15	1	6AV210.-...5-0	
SIMATIC WinCC Advanced V15	1	6AV2101-0AA05-0AA5	Package V15 Download license also possible
SIMATIC WinCC Runtime Advanced 4096 PowerTags (V15)	1	6AV2104-0HA05-0AA0	Package V15 Download license also possible

2 Engineering

2.1 Interface description

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

The following PLC data types are predefined data structure in which the user contents of the telegrams are stored:

- "typeDataS71500SEL"
- "typeDataS71200SEL"

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 (left position) TRUE: TD1 on (right position)
stateDipSwitchTD2	Bool	FALSE	DIP switch "TD2" status FALSE: TD2 off (left position) 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

Parameters	Data type	Start value	Description
outputCurrentLimit5	Int	0	Current limit value output 5
outputCurrentLimit6	Int	0	Current limit value output 6
outputCurrentLimit7	Int	0	Current limit value output 7
outputCurrentLimit8	Int	0	Current limit value output 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	Nominal output current
outputNumber	Int	4	Number of outputs
productState	Int	1	Product version
firmwareVersion	Int	1	Firmware version
startupSequence	Int	0	0: Load-dependent startup 1: Time delay startup 25 ms 2: Time delay startup 200 ms 3: Time delay startup 500 ms
setReset	Bool	FALSE	This parameter initiates the resetting of the outputs, e.g. via digital input or HMI operator device.
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	Article number
serialNumber	String	Q6/L1	Part of serial number

2.1.2 PLC data type and HMI data type for S7-300 / S7-400

The PLC data type "typeDataS7300SEL" is a predefined data structures in which the user contents of the telegrams are stored.

The faceplates "fpComAdvDetailS7300" und "fpComAdvOverviewS7300" use the HMI data type "typeDataS7300SELHMI" to access the data of the PLC data type "typeDataS7300SEL" and show the data of the PLC data type on HMI operator device.

The PLC data type "typeDataS7300SEL" and the HMI data type "typeDataS7300SELHMI" have the same structure.

Using an HMI connection for the absolute access from the HMI data type to the PCL data type in S7-300 / S7-400 CPU.

The following table shows the structure of the PLC data type "typeDataS7300SEL" and HMI data type "typeDataS7300SELHMI".

Tabelle 2-2

Parameter	Datentyp	Offset	Startwert	Beschreibung
deviceName	String	0.0	SEL1200	Device name
stateCOM	Bool	256.0	TRUE	DIP switch "COM" status TRUE: Diagnostic interface "COM" activated FALSE: Diagnostic interface "COM" deactivated
stateDipSwitchTD1	Bool	256.1	FALSE	DIP switch "TD1" status FALSE: TD1 off (left position) TRUE: TD1 on (right position)
stateDipSwitchTD2	Bool	256.2	FALSE	DIP switch "TD2" status FALSE: TD2 off (left position) TRUE: TD2 on (right position)
stateOutput1	Int	258.0	0	See Table 1-3
stateOutput2	Int	260.0	0	See Table 1-3
stateOutput3	Int	262.0	0	See Table 1-3
stateOutput4	Int	264.0	0	See Table 1-3
stateOutput5	Int	266.0	0	See Table 1-3
stateOutput6	Int	268.0	0	See Table 1-3
stateOutput7	Int	270.0	0	See Table 1-3
stateOutput8	Int	272.0	0	See Table 1-3
outputCurrent1	Int	274.0	0	Output current at output 1
outputCurrent2	Int	276.0	0	Output current at output 2

Parameter	Datentyp	Offset	Startwert	Beschreibung
outputCurrent3	Int	278.0	0	Output current at output 3
outputCurrent4	Int	280.0	0	Output current at output 4
outputCurrent5	Int	282.0	0	Output current at output 5
outputCurrent6	Int	284.0	0	Output current at output 6
outputCurrent7	Int	286.0	0	Output current at output 7
outputCurrent8	Int	288.0	0	Output current at output 8
outputCurrentLimit1	Int	290.0	0	Current limit value output 1
outputCurrentLimit2	Int	292.0	0	Current limit value output 2
outputCurrentLimit3	Int	294.0	0	Current limit value output 3
outputCurrentLimit4	Int	296.0	0	Current limit value output 4
outputCurrentLimit5	Int	298.0	0	Current limit value output 5
outputCurrentLimit6	Int	300.0	0	Current limit value output 6
outputCurrentLimit7	Int	302.0	0	Current limit value output 7
outputCurrentLimit8	Int	304.0	0	Current limit value output 8
reasonOutputSwitchedOff1	Int	306.0	0	See Table 1-7
reasonOutputSwitchedOff2	Int	308.0	0	See Table 1-7
reasonOutputSwitchedOff3	Int	310.0	0	See Table 1-7
reasonOutputSwitchedOff4	Int	312.0	0	See Table 1-7
reasonOutputSwitchedOff5	Int	314.0	0	See Table 1-7
reasonOutputSwitchedOff6	Int	316.0	0	See Table 1-7
reasonOutputSwitchedOff7	Int	318.0	0	See Table 1-7
reasonOutputSwitchedOff8	Int	320.0	0	See Table 1-7
nominalOutputCurrent	Int	322.0	3	Nominal output current
outputNumber	Int	324.0	4	Number of outputs
productState	Int	326.0	1	Product version
firmwareVersion	Int	328.0	1	Firmware version
startupSequence	Int	330.0	0	0: Load-dependent startup 1: Time delay startup 25 ms 2: Time delay startup 200 ms 3: Time delay startup 500 ms

Parameter	Datentyp	Offset	Startwert	Beschreibung
setReset	Bool	332.0	FALSE	This parameter initiates the resetting of the outputs, e. g. via digital input or HMI operator device.
stateReset	Bool	332.1	FALSE	TRUE: At least one output must be reset. FALSE: No output must be reset.
stateNoCommunication	Bool	332.2	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	334.0	6EP4437-7FB00-0CX0	Article number
serialNumber	String	590.0	Q6/L1	Part of the serial number

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 course and to store the contents of the 4 telegrams in a predefined data structure at the output "dataPsu".

The Figure 2-1 shows the call of the FB "LSEL_SignalEvaluationS71500" in the user program.

Call up the FB "LSEL_SignalEvaluationS71500" in the user program of the S7-CPU in a wake-up alarm OB with a maximum of 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 2-1
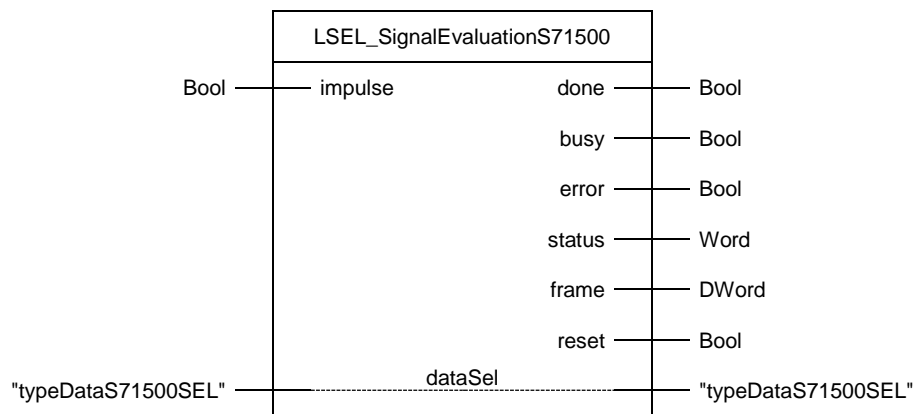
The following table shows the parameters of the
FB "SEL_SignalEvaluationS71500".

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 user contents 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 several times with the same instance DB.

2.1.4 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 course and to store the contents of the 4 telegrams in a predefined data structure at the output "dataSel".

The shows the call of the FB "LSEL_SignalEvaluationS71200" in the user program.

Call up the FB "LSEL_SignalEvaluationS71200" in the user program of the S7-CPU in a wake-up alarm OB with a maximum of 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_SignalEvaluationS71200" outputs an error with the value 16#8001 at the output "status".

Figure 2-2
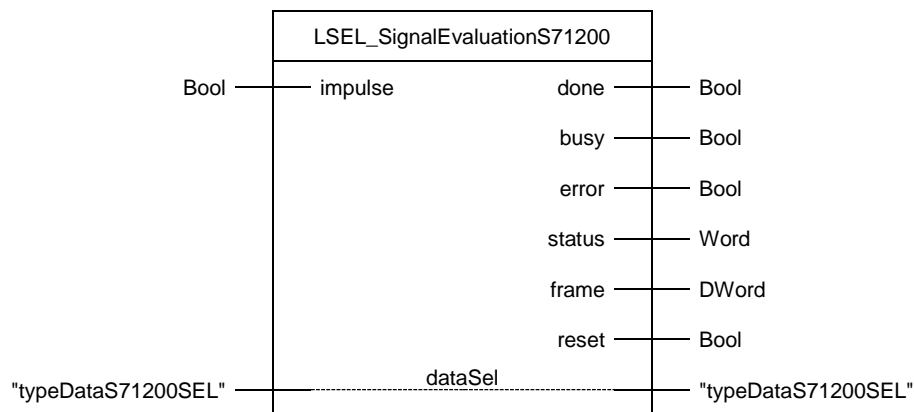
The following table shows the parameters of the
FB "LSEL_SignalEvaluationS71200".

Table 2-4

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 user contents 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_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 several times with the same instance DB.

2.1.5 FB "LSEL_SignalEvaluationS7300"

The FB "LSEL_SignalEvaluationS7300" reads the signal of the diagnostic interface "COM" at the input "impulse" in order to evaluate the signal course and to store the contents of the 4 telegrams in a predefined data structure at the output "dataSel".

The shows the call of the FB "LSEL_SignalEvaluationS7300" in the user program.

Call up the FB "LSEL_SignalEvaluationS7300" in the user program of the S7-CPU in a cyclic interrupt OB with a maximum of 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.

Figure 2-3
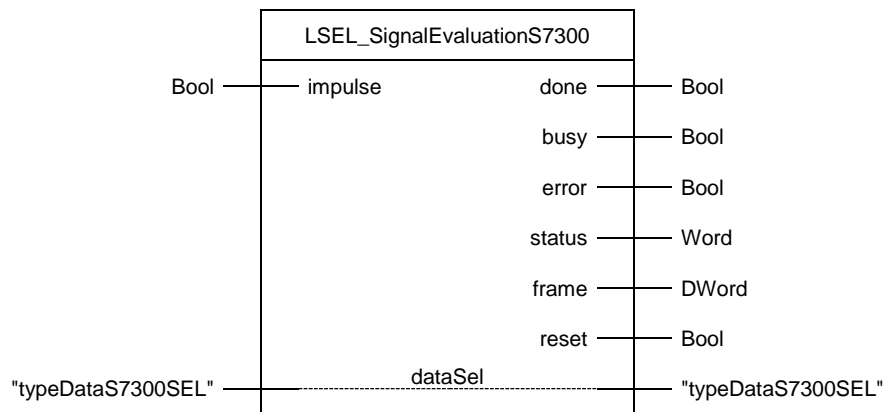
| NOTE | If the cycle time exceeds 10 ms, the FB "LSEL_SignalEvaluationS7300" outputs an error with the value 16#8001 at the output "status". |

The following table shows the parameters of the
FB "LSEL_SignalEvaluationS7300".

Table 2-5

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_SignalEvaluationS7300" 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	"typeDataS7S00SEL"	Predefined data structure in which the status information and the user contents of the telegrams are stored. Detailed information on the structure of the predefined data structure can be found in Section 2.1.2.

NOTE	The instance DB of the FB "LSEL_SignalEvaluationS7300" is generated when the FB "LSEL_SignalEvaluationS7300" is called. For each call of the FB "LSEL_SignalEvaluationS7300" you need a separate instance DB. The FB "LSEL_SignalEvaluationS7300" must not be called several times with the same instance DB.

2.1.6 Faceplates "fpComAdvDetailS7xy00SEL"

The following faceplates provide different categories with different properties for parameterization via the interface.

- "fpComAdvDetailS71500SEL"
- "fpComAdvDetailS71200SEL"
- "fpComAdvDetailS7300SEL"

The categories fulfil the following purposes:

- Data: Property for the variable binding
- StyleElements: Properties for changing the style of the faceplate
- Trends: Properties for parameterizing the trends for the trend display

Figure 2-4
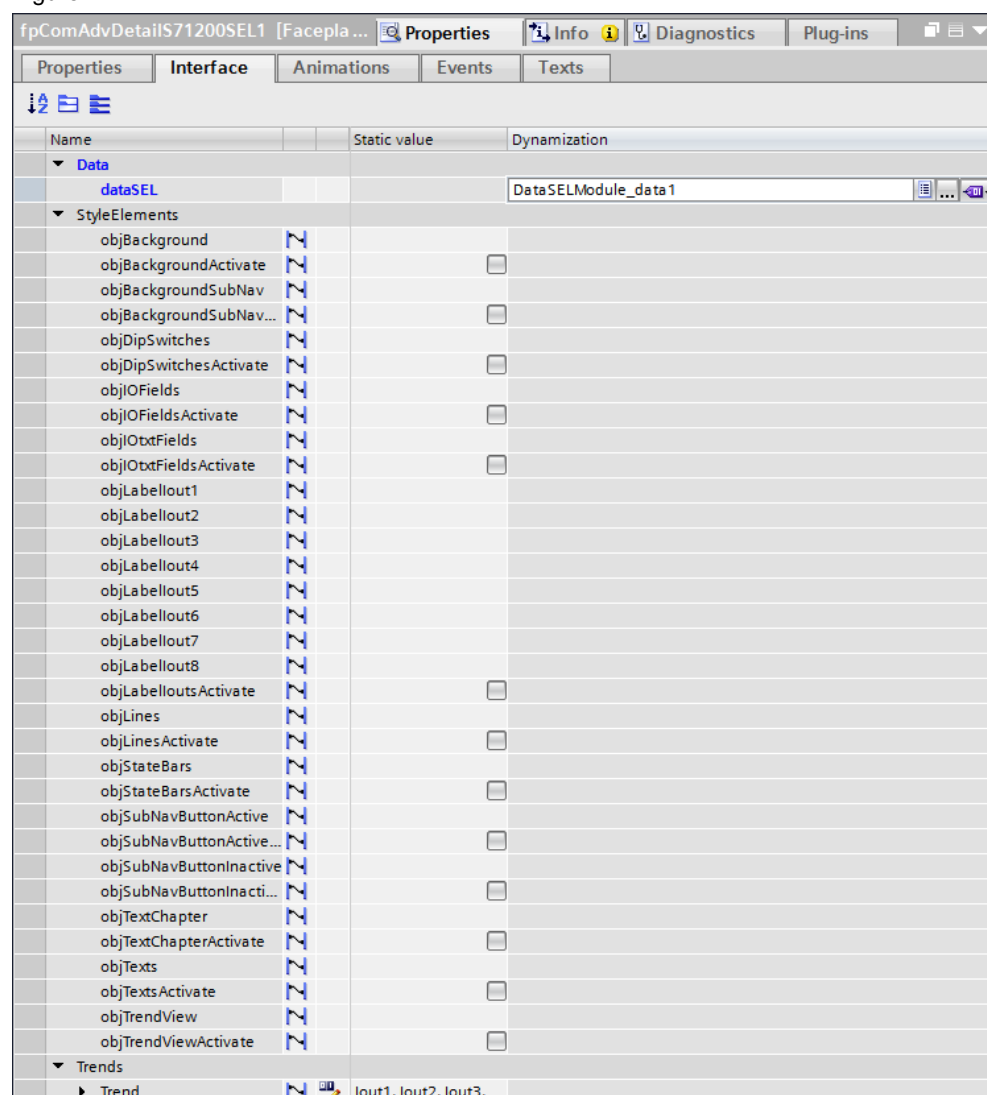
2.1.7 Faceplates "fpComAdvOverviewS7xy00SEL"

The following faceplates provide different categories with different properties for parameterization via the interface.

- "fpComAdvOverviewS71500SEL"
- "fpComAdvOverviewS71200SEL"
- "fpComAdvOverviewS7300SEL"

The categories fulfil the following purposes:

- Data: Property for the variable binding
- StyleElements: Properties for changing the style of the faceplate

Figure 2-5
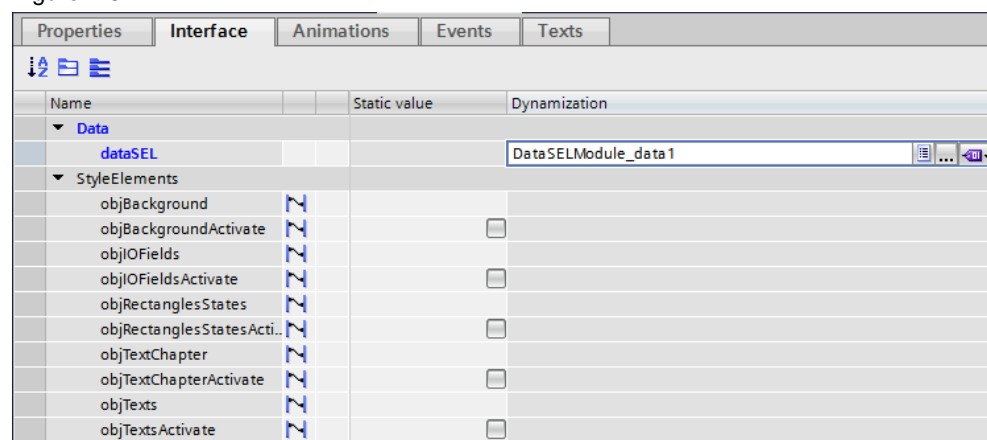
2.2 Configuration

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.
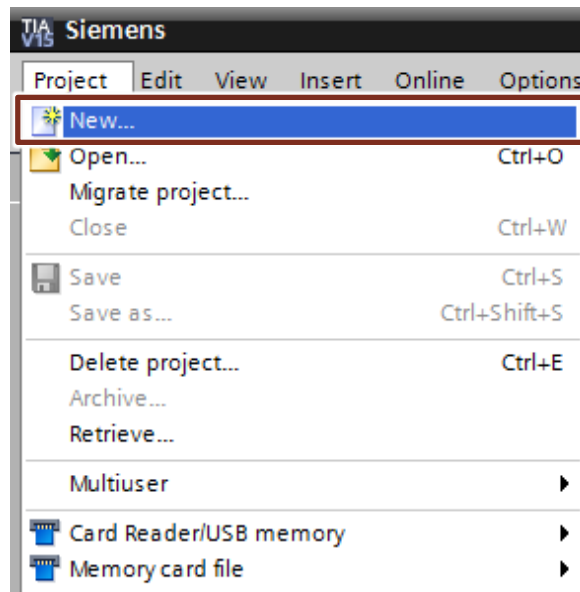
3. Enter your project name and path or accept the proposed data.
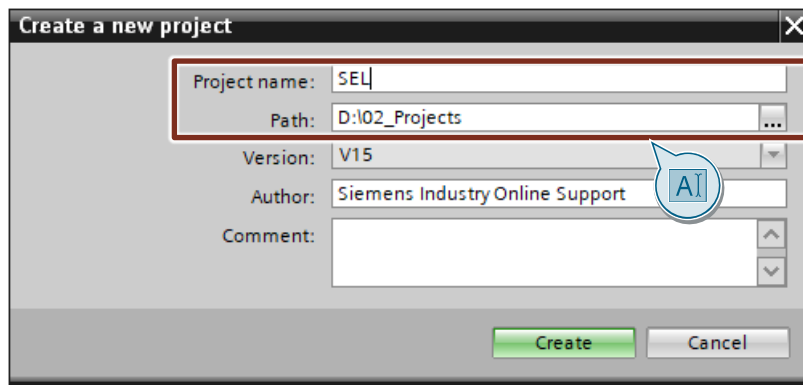
4. Click on the "Create" button. The new project is created and displayed in the project tree.

Create a new project		
Project name:	SEL	
Path:	D:\02_Projects	...
Version:	V15	
Author:	Siemens Industry Online Support	
Comment:		
	Create	Cancel
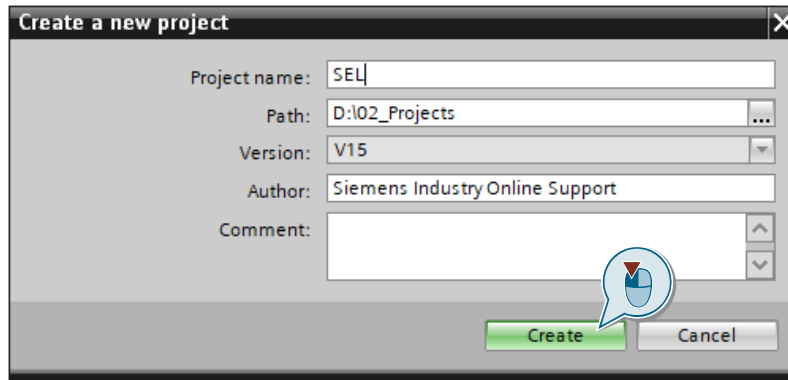
2.2.2 Integration of a S7-CPU into the user project

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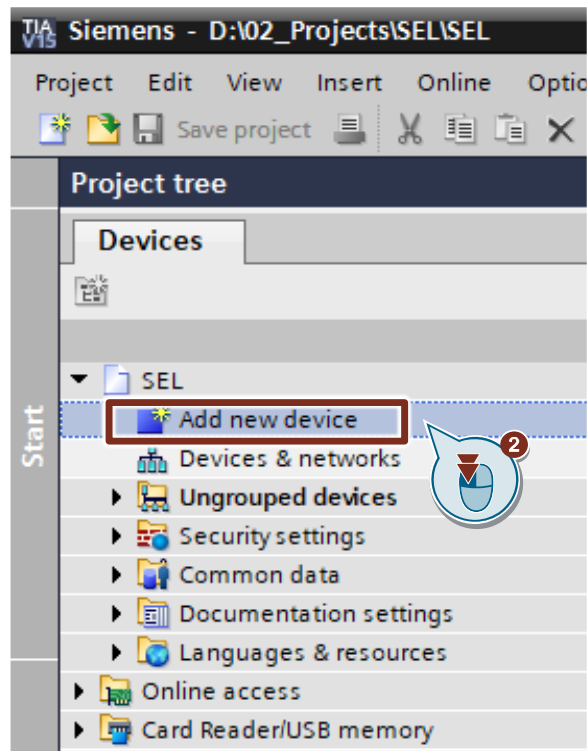
3. Under "Controllers", select the part number of the desired S7 CPU.
4. Set the firmware status via the drop-down list of the dialog.
5. Activate the option box "Open device view".
6. Click the "OK" button to add the selected S7 CPU.
   The dialog box closes and the "Device view" of the S7 CPU opens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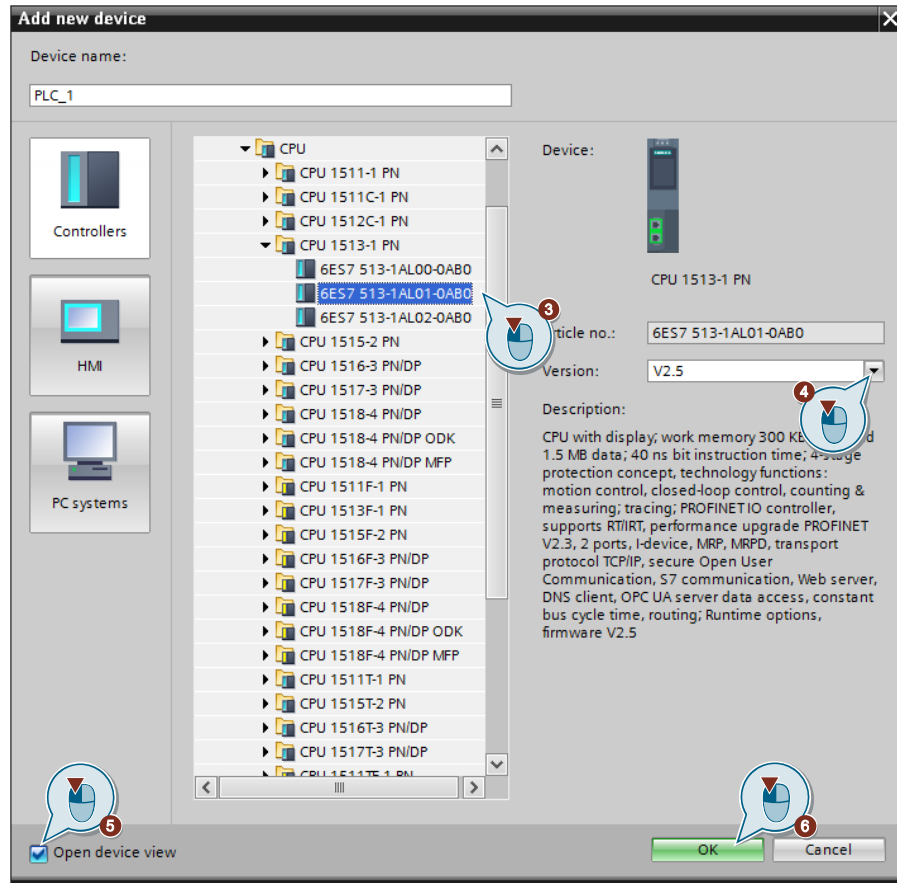
Adjust hardware configuration for S7-CPU

1. Mark 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.
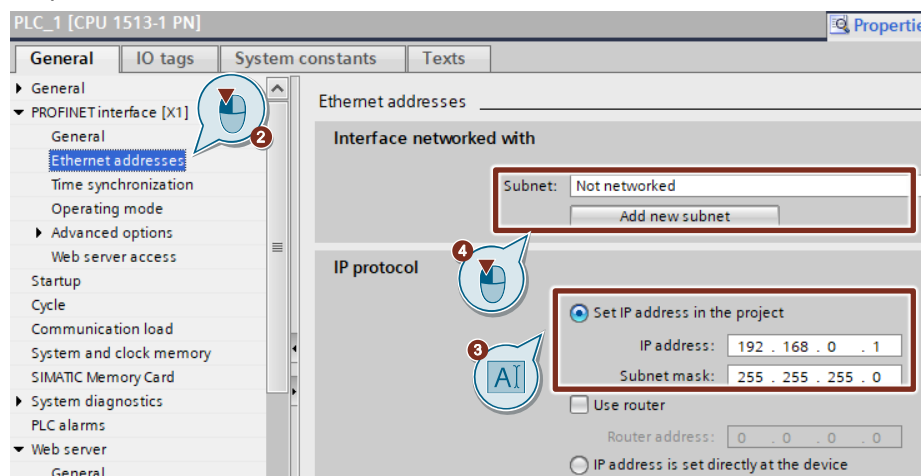
Integrate a digital input module into the user project

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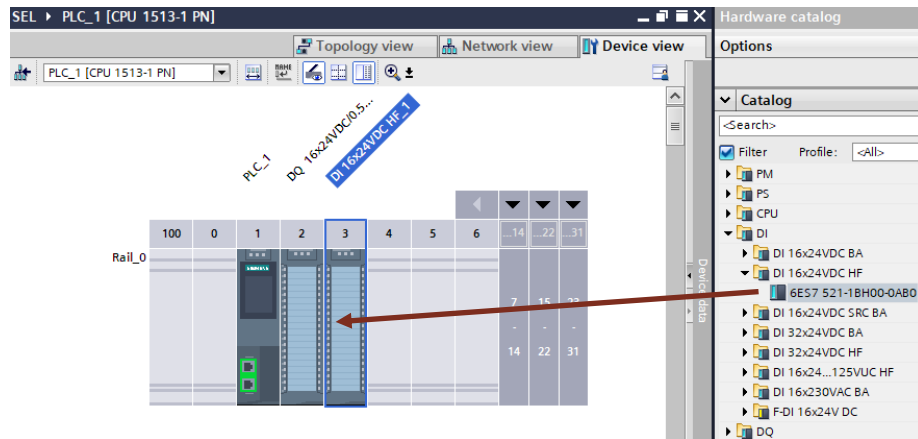
4. The preset address of the digital inputs is displayed in the table area of the device view. You can change it if necessary.

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).
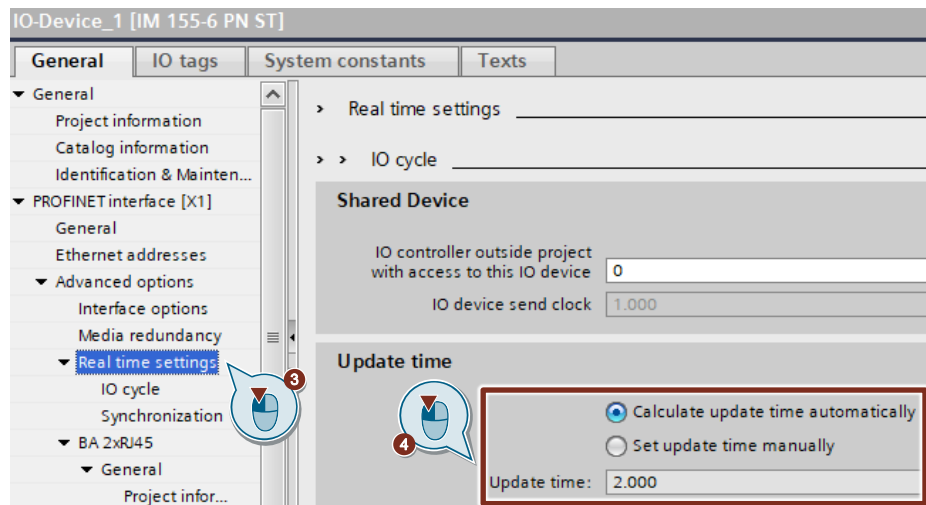
Assign the sub-process image (TPA) of the digital input module to the cyclic interrupt OB

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 sub-process images 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 cyclic interrupt OB, you must assign a sub-process image of the digital input module to the cyclic interrupt OB. Thus, the subprocess image is automatically updated when the 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 sub-process image, e.g. TPA 1.
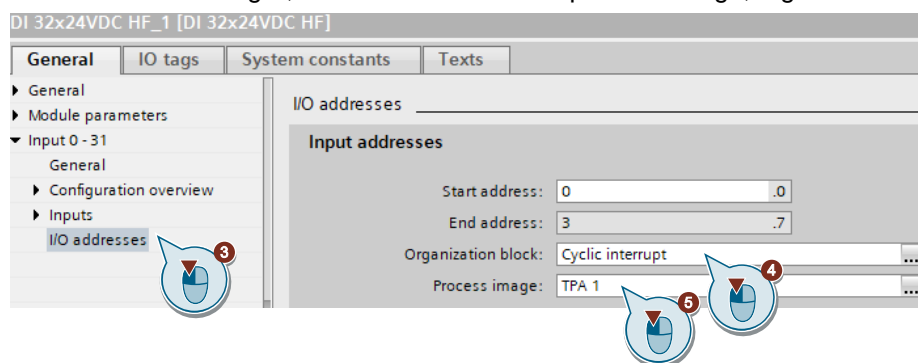
2.2.3 Integration of an HMI operating device

Adding an HMI device

1. Add a new device to your project via "Project tree > Add new device". The dialog box "Add new device" opens.
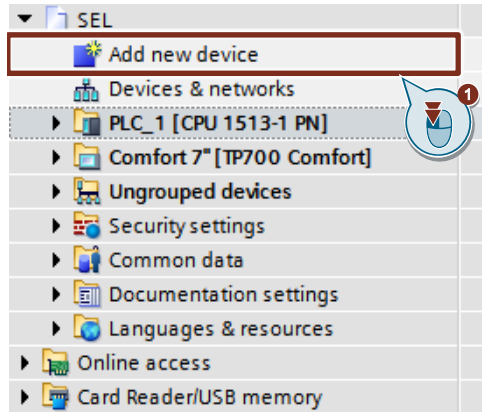
2. Select the desired HMI operating device under "HMI" and assign a name.
3. **Optional**
   If necessary, set the software version via the drop-down list of the dialog.
4. Select the check box "Start device wizard".

5. Click on the "OK" button to add the selected HMI operating device.
   The dialog box closes, and the inserted HMI operating device is displayed in
   the project tree.
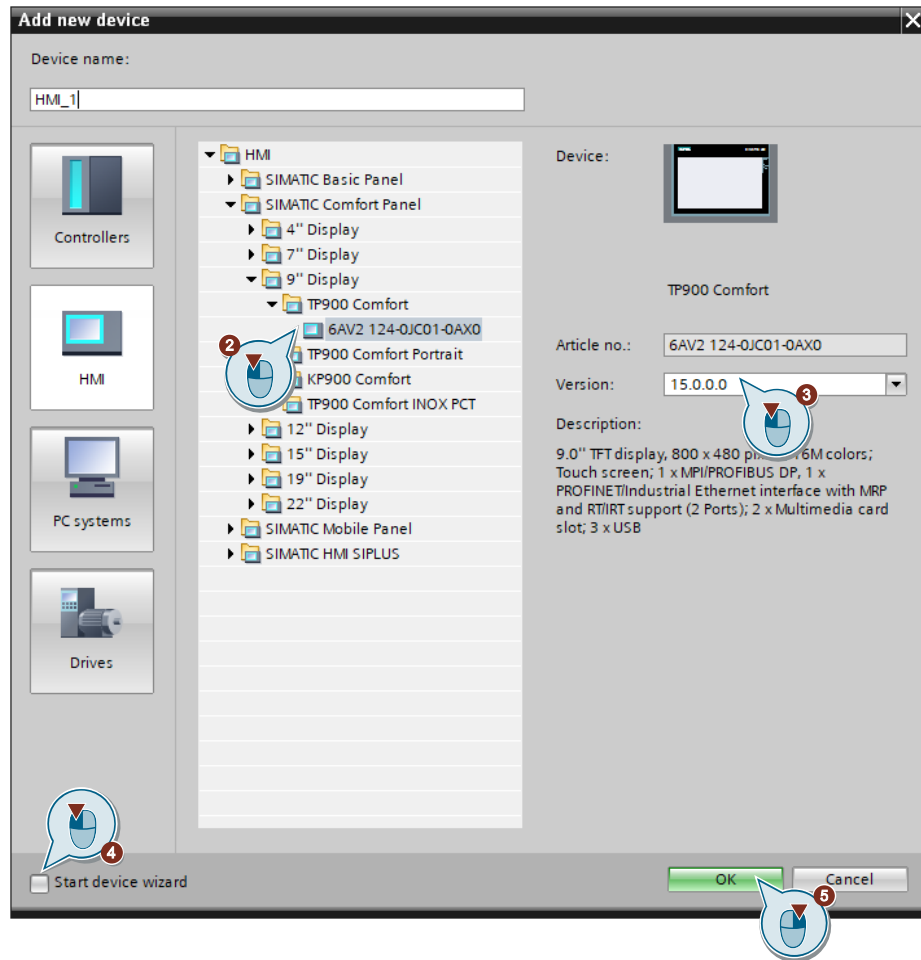
Configuring the HMI operating device

1. Use the "Project tree" to navigate to the device folder of the HMI operating device.

2. Double-click on the "Device configuration" command to open the hardware and network editor in the "Device view" of the HMI operating device.
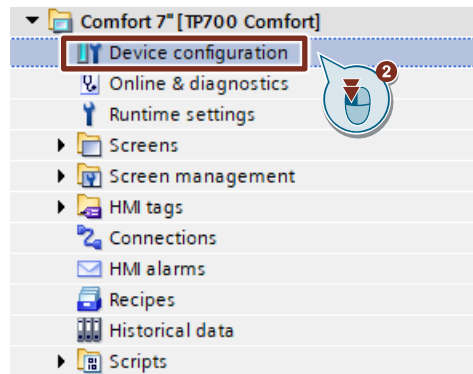
3. Mark the HMI operating device in the graphical area of the "Device view". The "Properties" of the HMI operating device are displayed in the Inspector window.

4. In the "General" tab, navigate to "PROFINET interface [X1] > Ethernet addresses".

5. Enter the IP address and subnet mask of the HMI operating device.

6. Use the drop-down list to select the subnet to which the S7-CPU is connected.
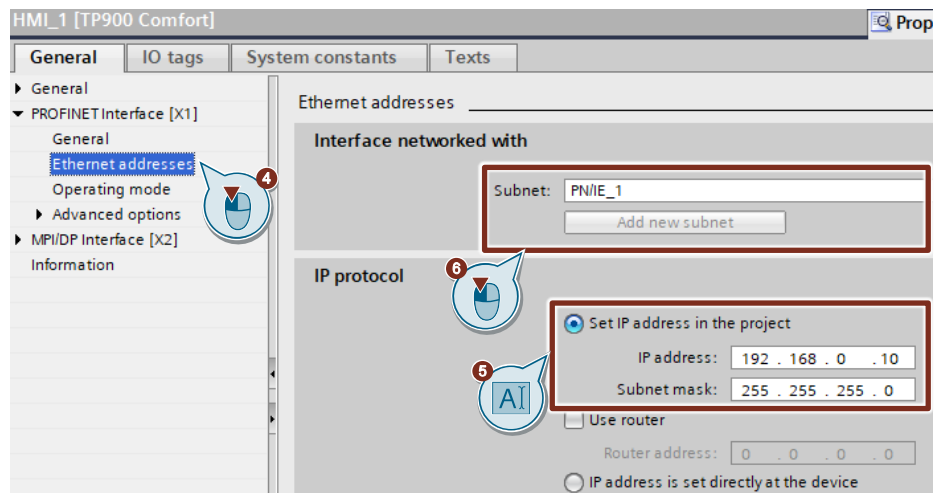
2.3 Create communication

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.

Figure 2-6
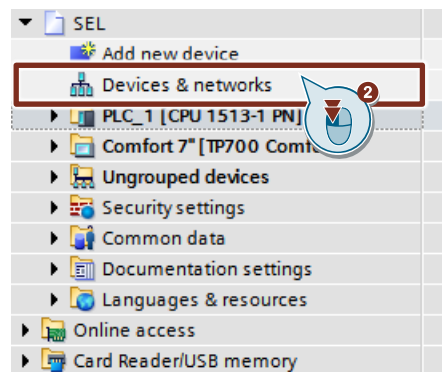
3. In the toolbar, click the "Connections" icon. This enables the connection mode.
4. Select the connection "HMI connection" in the adjacent drop-down list.
In the network view, all S7 CPUs and HMI operating devices that can be used for an HMI connection are highlighted in color.
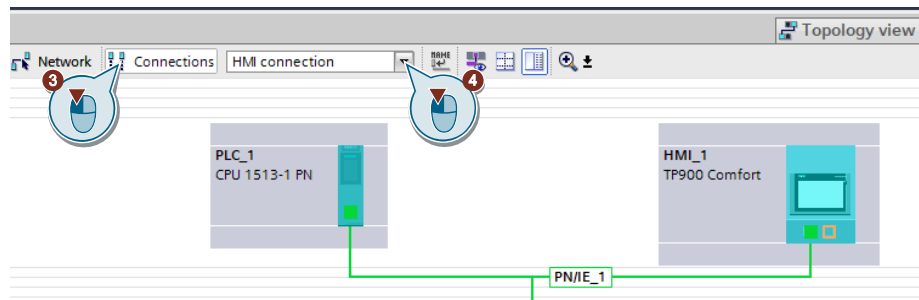
5. You can now have the connection path automatically defined or explicitly define a connection path via specific interfaces:

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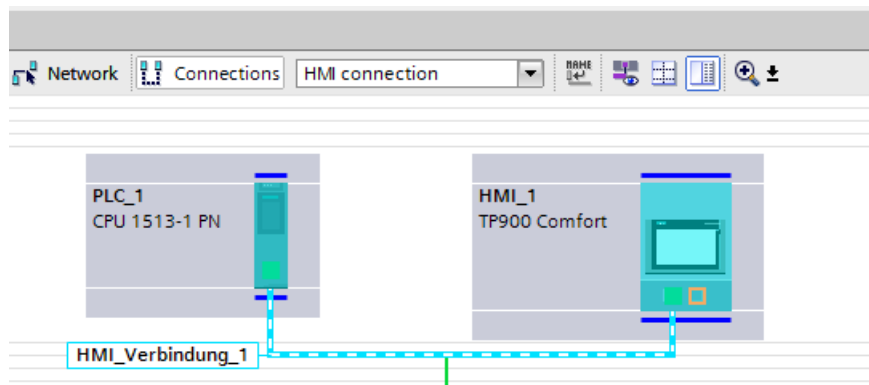
7. The connection settings are displayed in the Inspector window.
If necessary, change the name of the connection (e.g. "S7_1500").

2.3.2 Creating PLC variables

1. Navigate in the "Project tree" to the device folder of the S7-CPU.
2. In the "PLC tags" folder, double-click on the "Default tag table".
   The default tag table opens in the work area.
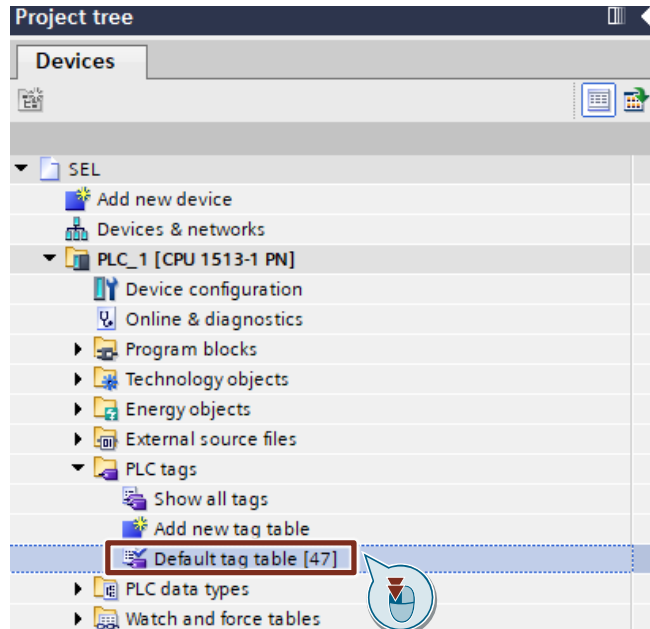
3. In the column "Address" enter the address of the digital input via which the diagnostics interface "COM" is read in.
4. Select the "Bool" data type in the "Date type" column.
5. Enter a name of your choice for the PLC variable in the column "Name".
6. In the "Address" column, enter the address of 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 Integration of the function blocks in the user program

2.4.1 Opening the library "LSEL_V15.0-0_V1-0-0" in STEP 7

Note   For this section you have to download the library "LSEL_V15.0-0_V1-0-0.zip" and extract it into a directory of your choice.

1. Click on the TaskCard "Libraries" and open the palette "Global libraries".
2. Click on the "Open global library" button to open the "LSEL_V15.0-0_V1-0-0" library.
   The corresponding dialog opens.
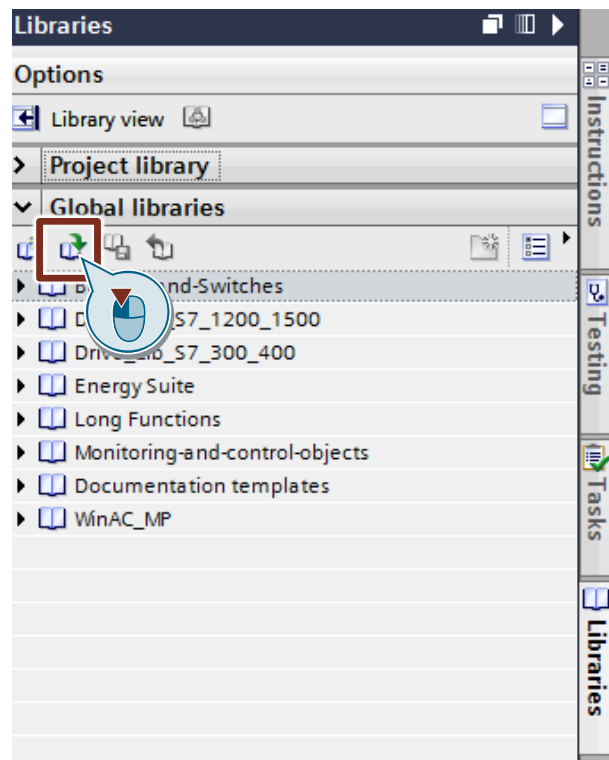
3. Select the global library "LSEL_V15.0-0_V1-0-0.al15" and confirm the selection via the button "Open".
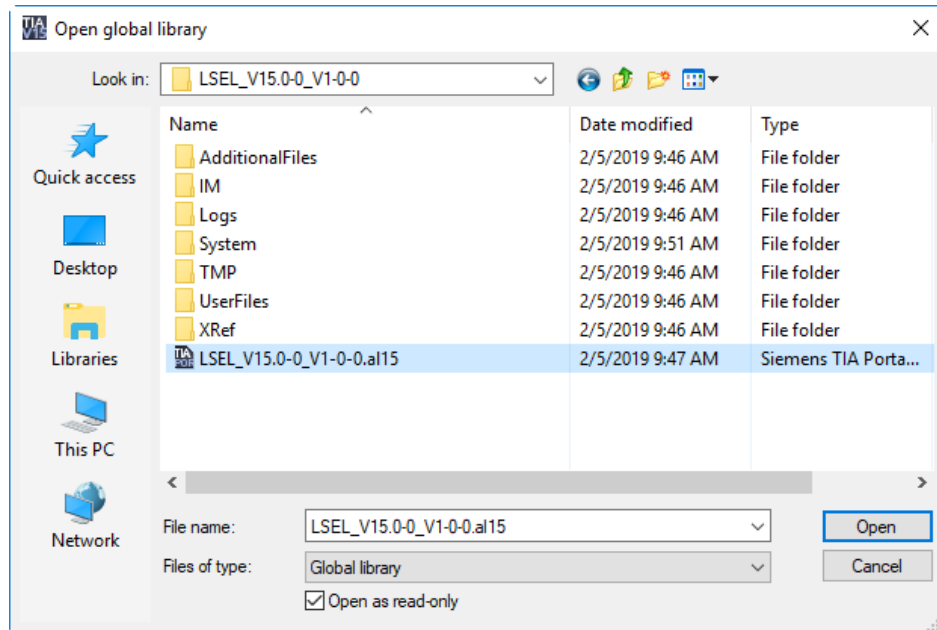
4. The library "LSEL_V15.0-0_V1-0-0.al15" is opened and displayed under the palette "Global libraries".
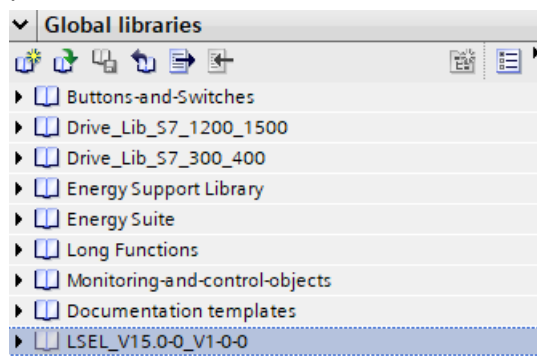
2.4.2 Copying Data Types and Function Modules to the User Project

1. In the library you find under "Types > 01_Blocks" the function blocks for communication for the following CPUs:
   - S7-1500: Function block "LSEL_SignalEvaluationS71500"
   - S7-1200: Function block "LSEL_SignalEvaluationS71200"
   - S7-300 / S7-400 CPUs: Function block "LSEL_SignalEvaluationS7300"
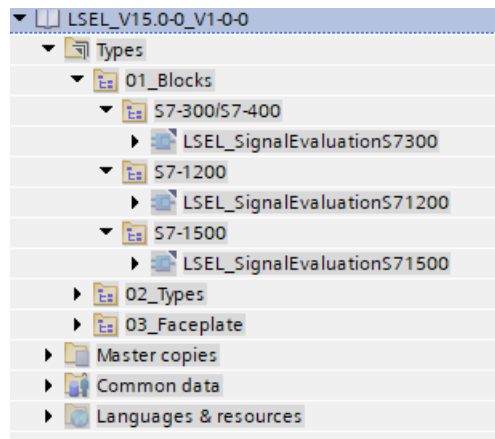
2. Insert the function block for your S7-CPU via drag & drop into the folder "Program blocks" of your device, e.g. S7-1500 CPU.
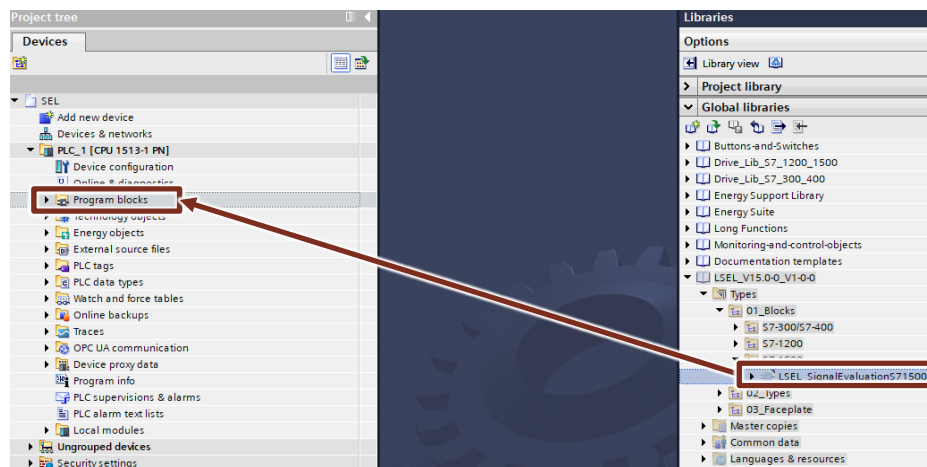
Note

The function modules each use their own user-defined PLC data type (UDT-User defined Data type).
- S7-1500: "typeDataS71500SEL"
- S7-1200: "typeDataS71200SEL"
- S7-300 / S7-400: "typeDataS7300SEL"

This is automatically inserted into the "PLC data types" folder of your S7-CPU when the respective function block is inserted.
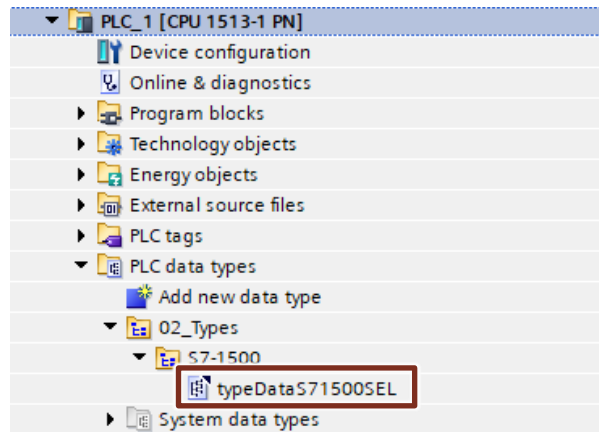
2.4.3 Create cyclic interrupt OB for S7-1200 and S7-1500

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 alarm OB.
   The dialog "Add new block" opens.
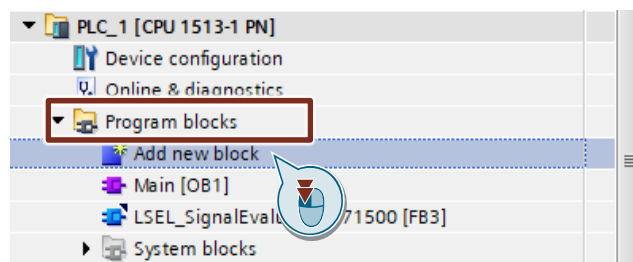
3. Make the following settings and then confirm your entries with the "OK" button.
   - Select the "Organization block" icon.
   - Select the entry "Cyclic interrupt" to create a cyclic interrupt OB.
   - Activate the "Automatic" radio button for automatic number assignment.
     The number of the alarm OB is assigned by STEP 7 (TIA Portal).
   - Enter the cycle time. The cycle time is given in microseconds (µs). The cycle time for calling the FB "LSEL_SignalEvaluationS71500" and FB "LSEL_SignalEvaluationS71200" must not exceed 10 ms.
   - Accept the settings with "OK".
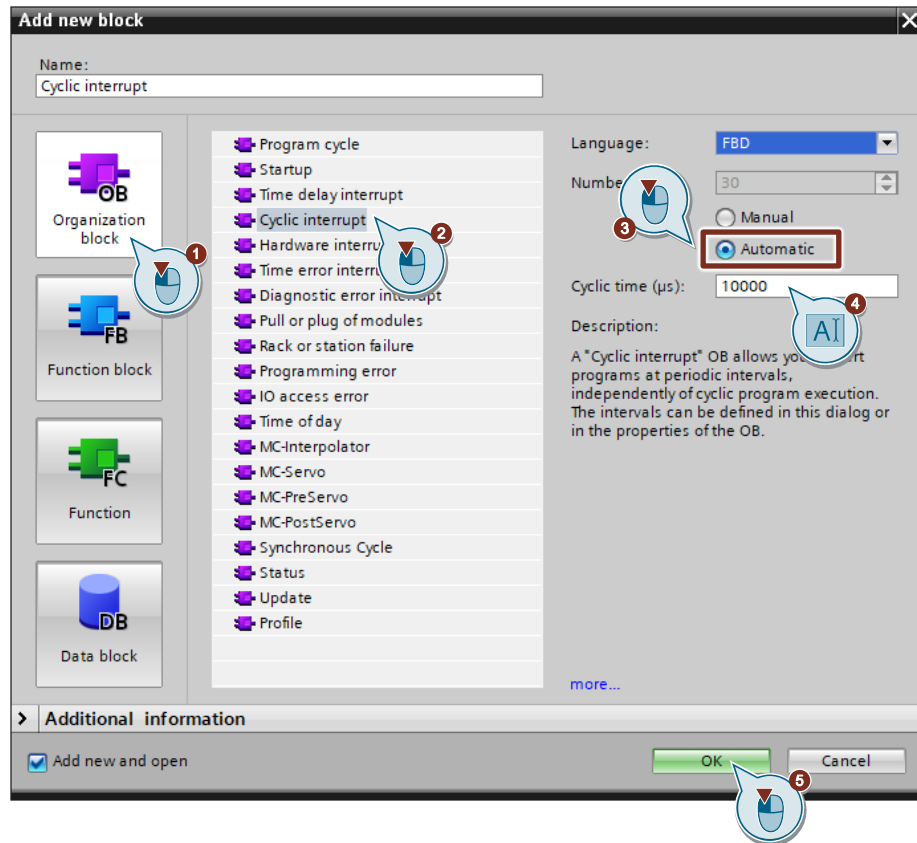
4. Double-click on the newly inserted cyclic interrupt OB to open the corresponding program editor.

5. Drag and drop the FB "LSEL_SignalEvaluationS71500" or FB "LSEL_SignalEvaluationS71200" from the project navigation into any network of the cyclic interrupt OB.
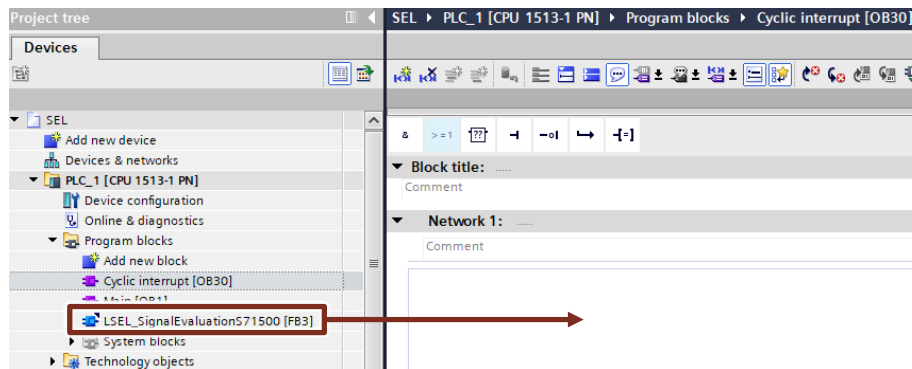
6. The dialog "Call options" for generating the instance DB of the FB "LSEL_SignalEvaluationS71500" or FB "LSEL_SignalEvaluationS71200" opens automatically.

7. Make the following settings and then confirm your entries with the "OK" button.

   - Enter the name of the instance DB.

   - Activate the "Automatic" radio button for automatic number assignment. The instance DB number is assigned by STEP 7 (TIA Portal).

   - Accept the settings with "OK".
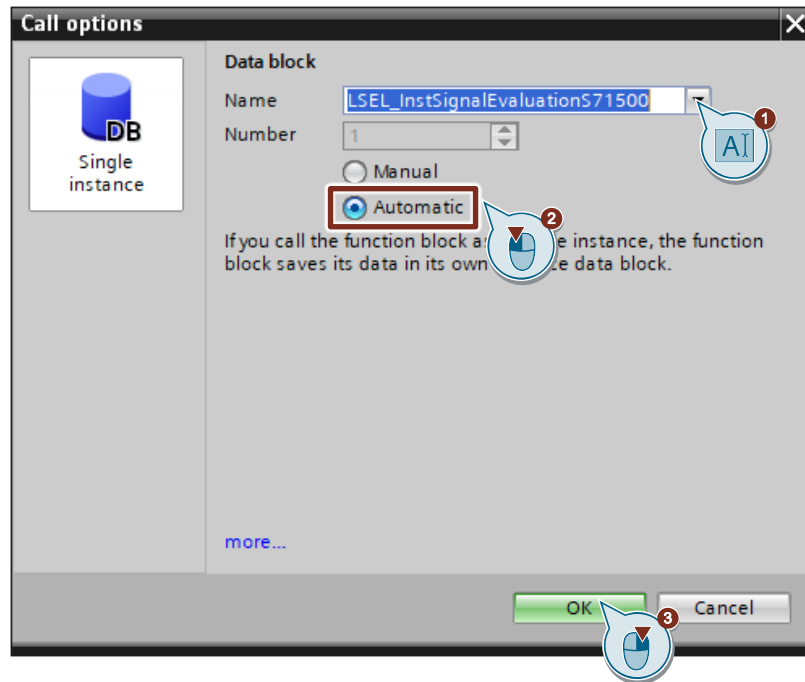
2.4.4 Create a cyclic interrupt OB for S7-300 / S7-400

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 cyclic interrupt OB. The dialog "Add new block" opens.
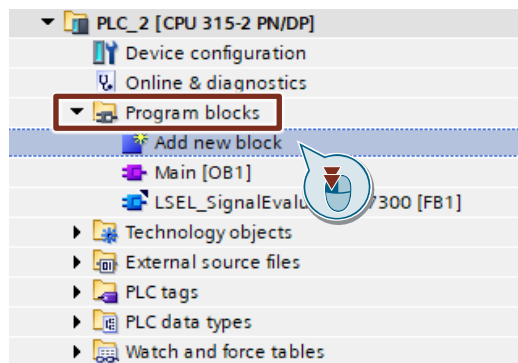
3. Make the following settings and then confirm your entries with the "OK" button.

   - Select the "Organization block" icon.

   - Select the entry "Time interrupts > Cyclic > CYC_INT5 [OB35]" to create a cyclic interrupt OB. The number of the cyclic interrupt OB is shown under "Select OB:". The OB35 is used in this example.

   - Accept the settings with "OK".
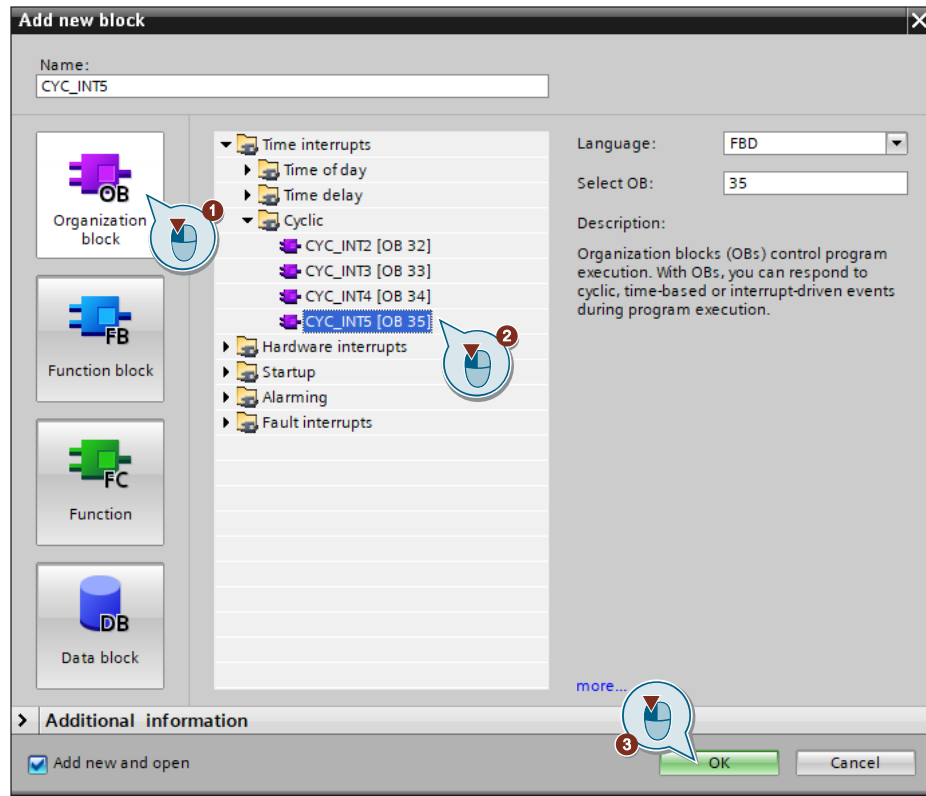
4. Double-click on the newly inserted cyclic interrupt OB to open the corresponding program editor.

5. Drag and drop the FB "LSEL_SignalEvaluationS7300" from the project navigation into any network of the cyclic interrupt OB.
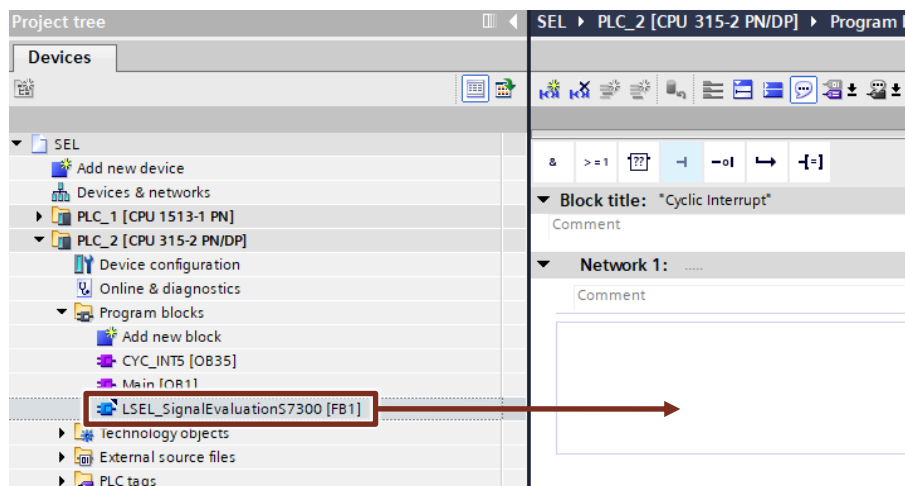
6. The dialog "Call options" for generating the instance DB of the FB "LSEL_SignalEvaluationS7300" opens automatically.

7. Make following settings and then confirm your entries with the "OK" button.

   - Enter the name of the instance DB.

   - Activate the "Automatic" radio button for automatic number assignment. The instance DB number is assigned by the TIA Portal.

   - Accept the settings with "OK".

Figure 2-7
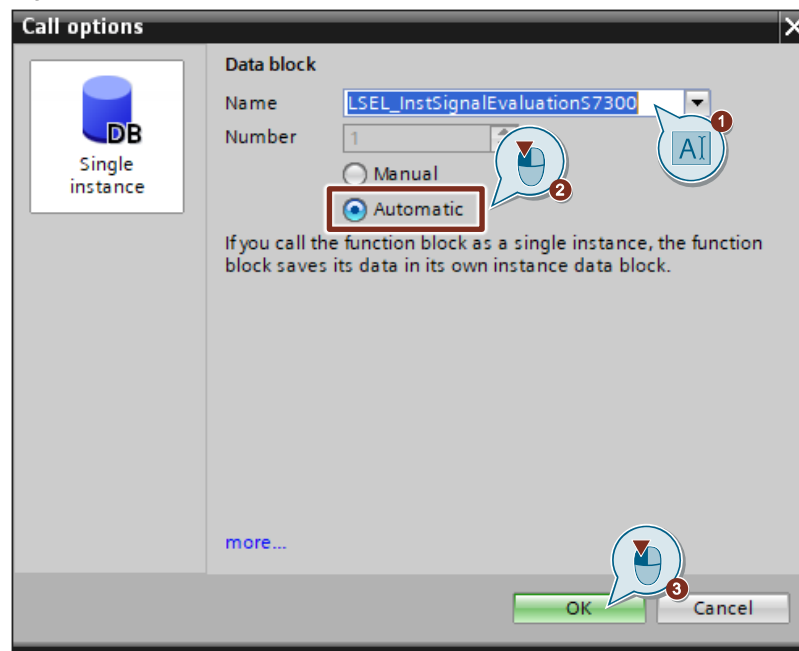
8. Navigate in the "Project tree" to the device folder of the S7-CPU and double-click the "Device configuration" command. The "Device view" of the S7-300 opens in the hardware and network editor.
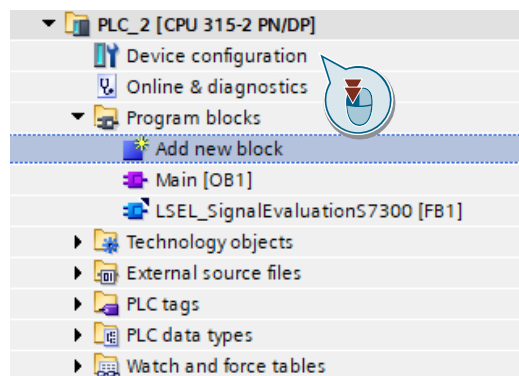
9. Mark the S7-300 CPU. The "Properties" of the S7-300 CPU are displayed in the inspector window.

10. In the "General" tab, navigate to "Interrupts > Cyclic interrupts".

11. Enter the value "10 ms" in the "Execution" column.
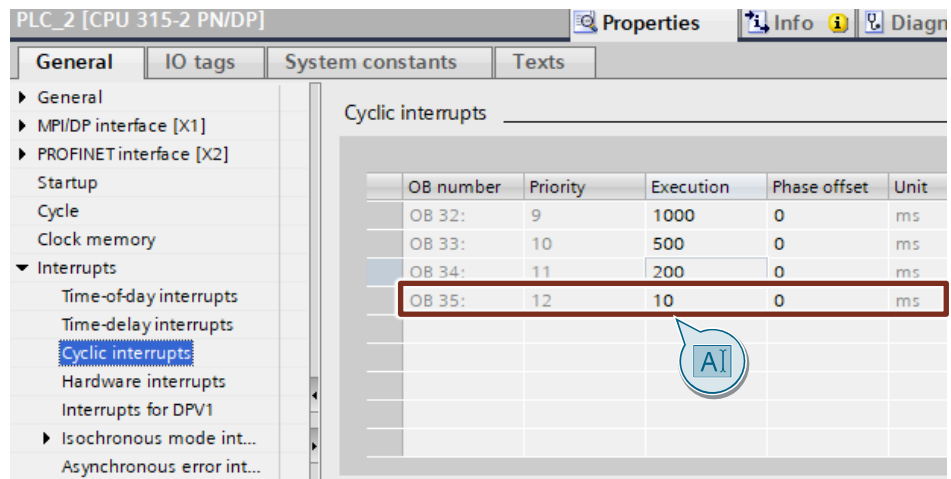
2.4.5 Creating a Global Data Block for Data Exchange

Note   This section shows you how to create a global data block for data exchange. The data block is used to store the data of the SITOP SEL1200 and SEL1400 which were read out with the help of the FBs "LSEL_SignalEvaluationS71500" and "LSEL_SignalEvaluationS71200".

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.
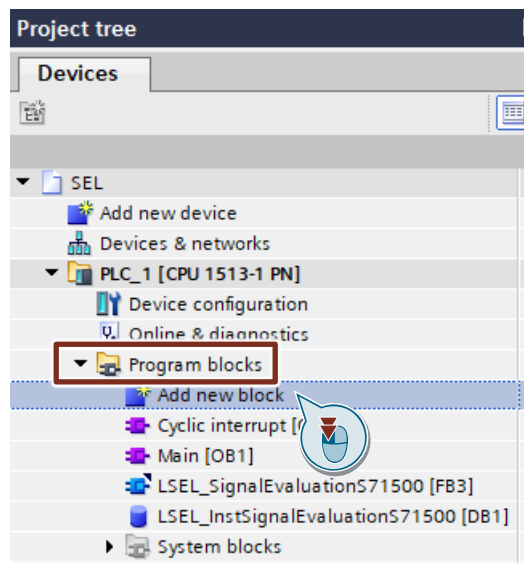
3. Make the following settings and then confirm your entries with the "OK" button.
   - Select the symbol "Data block".
   - Select "Global DB" as the type.
   - Enter the name of the DB
   - Activate the "Automatic" radio button for automatic number assignment.
     The number of the global DB is assigned by STEP 7 (TIA Portal).
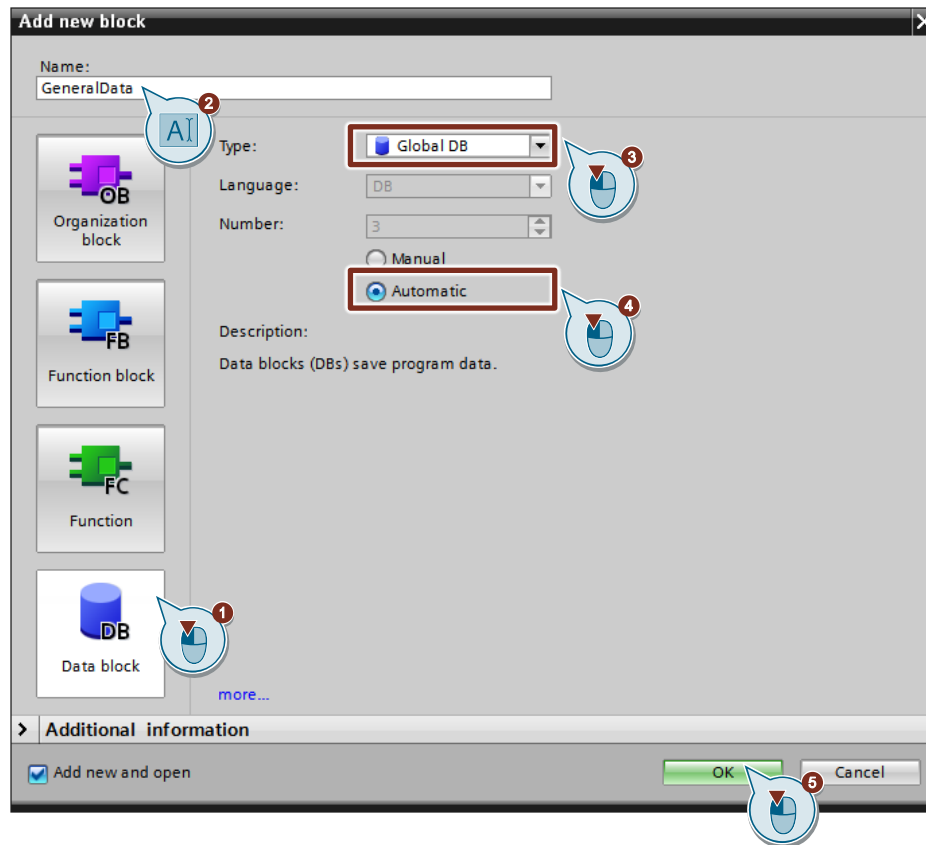
4. Double-click the newly inserted global data block to open it.
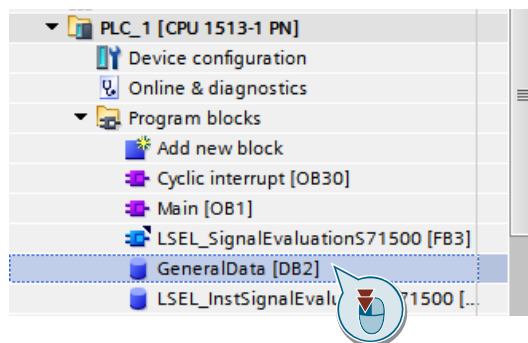
5. Double-click "<Add new>" to create the variables accordingly Table 2-6.
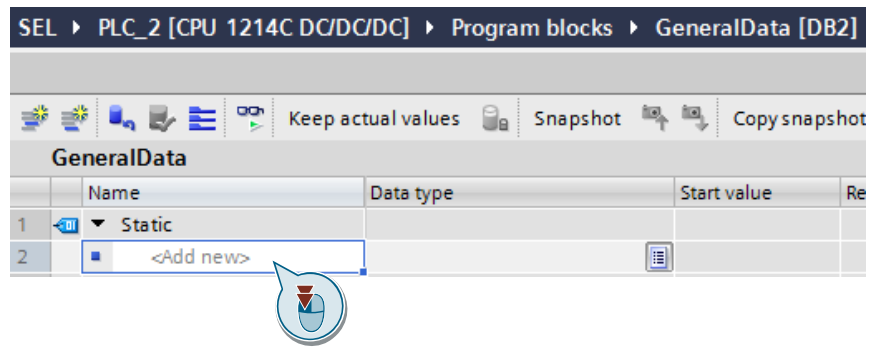
Table 2-6

Name	Data type	Interconnection at the 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"

2.4.6 Function block in the Application example

1. In the "Project tree" open the folder "Program blocks" of your S7-CPU.
2. Double-click on the alarm 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 section 2.3.2).
4. Assign the PLC variable that refers to the address of the digital output via which the RESET input of the SEL1200 / SEL1400 is controlled to the "reset" output.
5. Assign the remaining outputs of the FB with the variables that you have created in the global data block (see section 2.4.5).
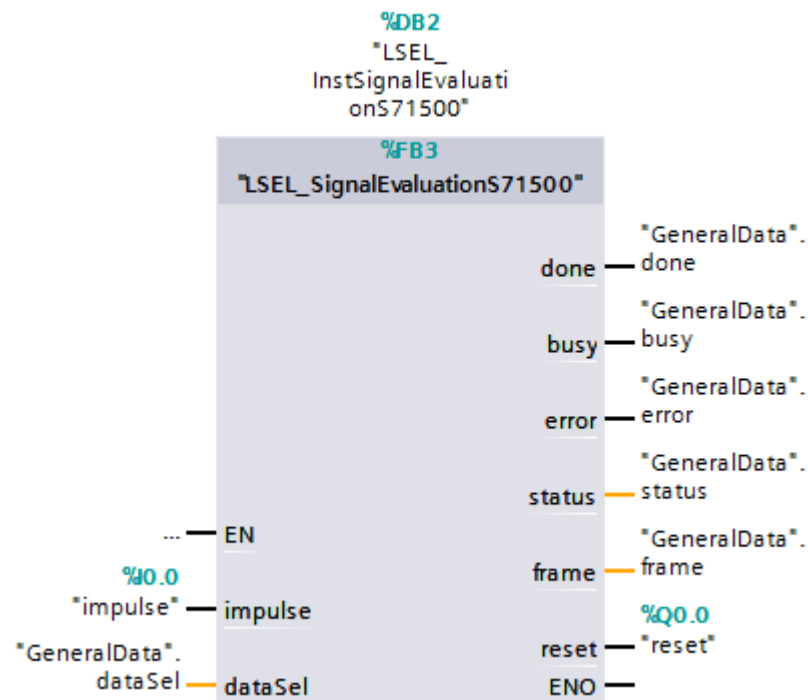
2.5 Integrating Faceplates for S7-1200 and S7-1500

2.5.1 Create an HMI tag

1. Navigate to the device folder of the HMI operating device in the "Project tree".

2. Open the "HMI tags" folder and double-click the "Add new tag table" command to create a new HMI variable table.
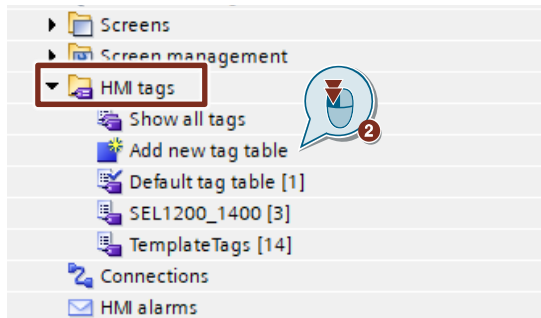
3. Name the tag table "SEL1200_1400" and double-click on the tag table to open it.

4. Create a variable "DataSELModule_data1".

5. Alternatively, you can find the "SEL1200_1400" tag table in the "LSEL_V15.0-0_V1-0-0" library in the folder "Master copies > HMI tags".

6. Insert the "SEL1200_1400" tag table by dragging and dropping into the "HMI tags" folder of the HMI operating device.
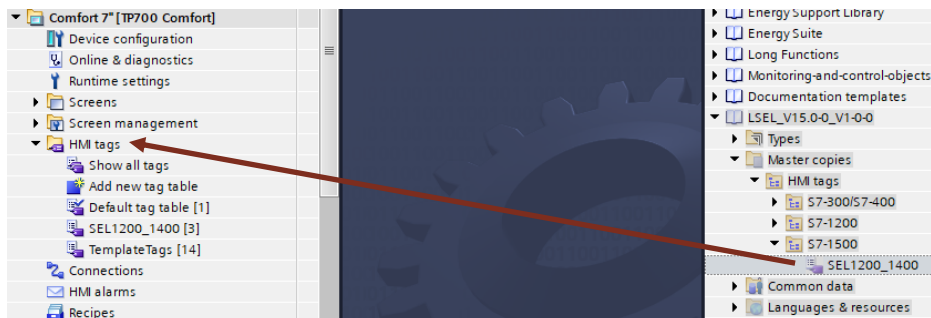
7. Select the variable "DataSELModule_data1" in the tag table. The properties of the variable are displayed in the Inspector window.
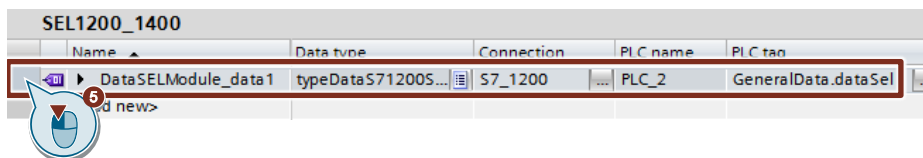
8. In the "General" tab, navigate to "Settings".

9. Select the following settings:
   - "Acquisition mode": "Cyclic continuous"
   - "Acquisition cycle": 1 s
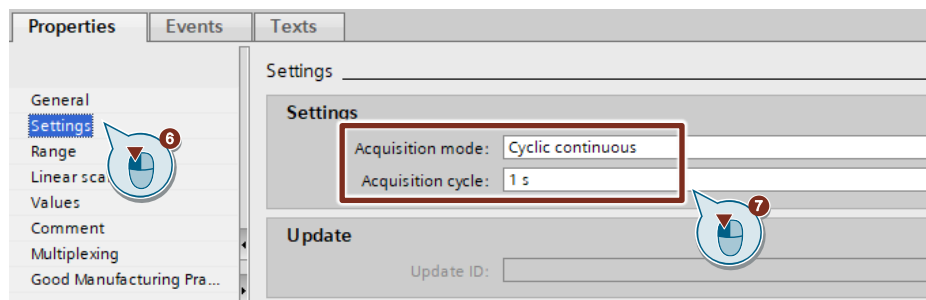
10. Connect the variable to the corresponding PLC variable of the data type "typeDataS71500SEL" or "typeDataS71200SEL".

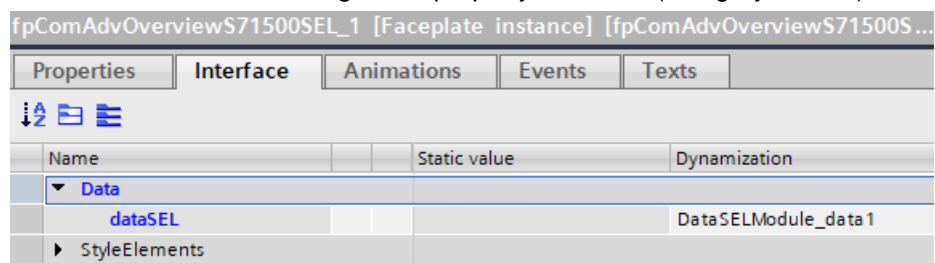| SEL1200_1400				
Name ▲	Data type	Connection	PLC name	PLC tag
▶ DataSELModule_data1	typeDataS71200SEL	S7_1200	PLC_2	GeneralData.dataSel
<Add new>				

2.5.2 Faceplate "fpComAdvDetailS71500SEL" and "fpComAdvDetailS71200SEL"

1. Navigate in the "Project tree" to the folder "Screens".

2. Double-click on the screen in which you want to integrate the faceplate for displaying the SITOP SEL1200 / SEL1400 device data. The screen opens.

3. Open the folder "Types > 03_Faceplate" of the library "LSEL_V15.0-0_V1-0-0". There you can find the faceplates for the S7-1500 CPUs and S7-1200 CPUs.

   - fpComAdvDetailS71500SEL: Faceplate for communication with S7-1500 CPUs to graphically display device data and output current.

   - fpComAdvOverviewS71500SEL: Faceplate for communication with S7-1500 CPUs shows an overview of the most important device data.

   - fpComAdvDetailS71200SEL: Faceplate for communication with S7-1200 CPUs to graphically display device data and output current.

   - fpComAdvOverviewS71200SEL: Faceplate for communication with S7-1200 CPUs shows an overview of the most important device data.

4. Insert an instance of the "fpComAdvDetailS71500SEL" or "fpComAdvDetailS71200SEL" by dragging and dropping into the opened screen.

5. Highlight the faceplate in the screen and open the interface of the faceplate in the "Properties > Interface" tab.

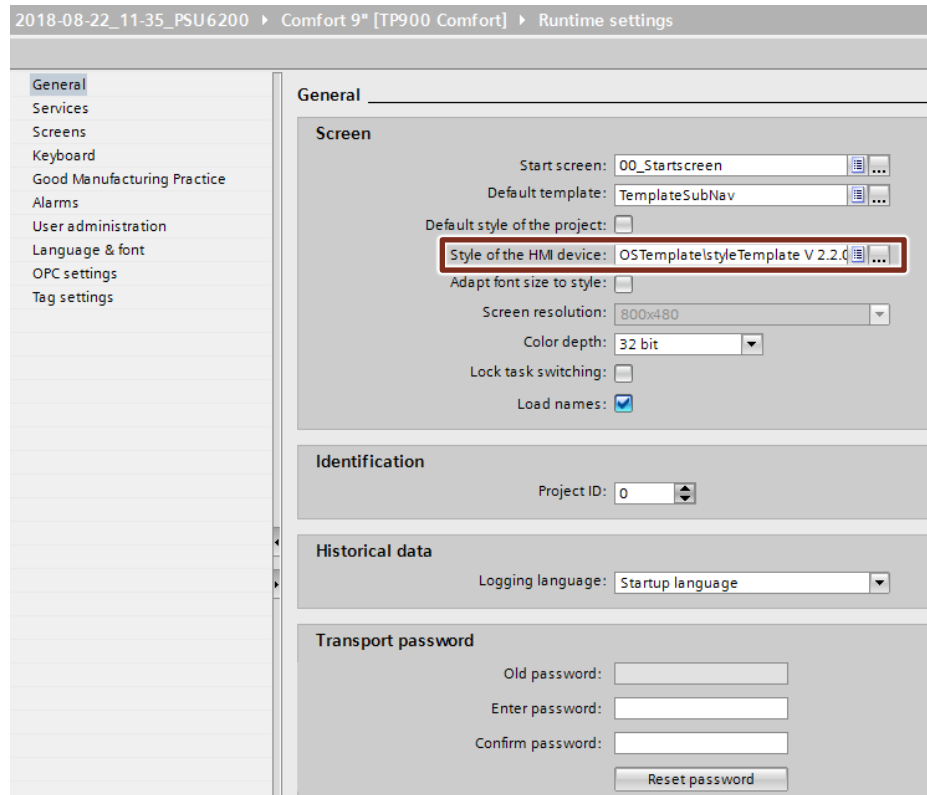6. Connect the created HMI tag to the property "dataSel" (category: "Data").
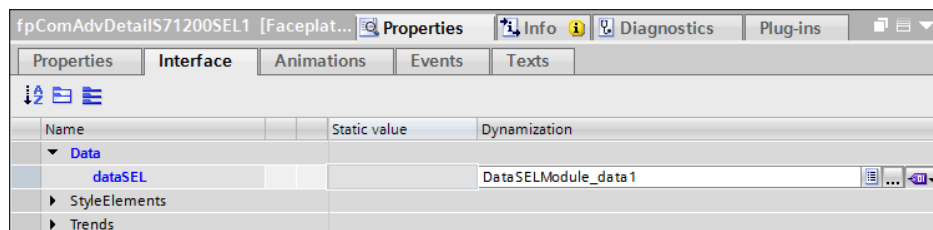
7. Create four or eight curves for the current values (depending on the hardware) via the "Trend" property (category: "Trends") with the following settings.
Table 2-7

Parameters	Value
"Name"	• Iout1, …, Iout8
"Style"	• "Line color": black, brown, orange, blue, red, green, yellow, turquoise • "Mode": "Interpolated" • "Line width": of your choice • "Line style": "Solid"
"Trend values"	At least 120
"Trend Type"	"Cyclical real time"
"Source Settings"	• "Process values": Variables "outputCurrent" • "Cyclic": 1 s
"Side"	• Left

8. **Optional: Perform this step if you would like to adjust the style of the faceplate to your own style.**
In the "Style Elements" category, you can find the properties to change individual styles of objects.

   – Select the desired object styles.

   – Accept the respective object style by activating the option box under the respective property.

Note

A current style for the HMI device must be activated in the runtime settings under "General > Screen > Style of the HMI device".

2.5.3 Faceplate "fpComAdvOverviewS71500SEL" and "fpComAdvOverviewS71200SEL"

1. Navigate in the "Project tree" to the folder "Screens".
2. Double-click on the screen in which you want to integrate the faceplate for displaying the SITOP SEL1200 / SEL1400 device data. The screen opens.
3. Open the folder "Types > 03_Faceplate" of the library "LSEL_V15.0-0_V1-0-0". There you can find the faceplates for the S7 1500 CPUs and S7-1200 CPUs.
   - fpComAdvDetailS71500SEL: Faceplate for communication with S7-1500 CPUs to graphically display device data and output current.
   - fpComAdvOverviewS71500SEL: Faceplate for communication with S7-1500 CPUs shows an overview of the most important device data.
   - fpComAdvDetailS71200SEL: Faceplate for communication with S7-1200 CPUs to graphically display device data and output current.
   - fpComAdvOverviewS71200SEL: Faceplate for communication with S7-1200 CPUs shows an overview of the most important device data.

4. Insert an instance of the "fpComAdvOverviewS71500SEL" or " fpComAdvOverviewS71200SEL " by dragging and dropping into the opened screen.
5. Highlight the faceplate in the screen and open the interface of the faceplate in the "Properties > Interface" tab.
6. Connect the created HMI tag to the property "dataSel" (category: "Data").

7. **Optional: Perform this step if you would like to adjust the style of the faceplate to your own style.**
   In the "Style Elements" category, you can find the properties to change individual styles of objects.

   - Select the desired object styles.

   - Accept the respective object style by activating the option box under the respective property.

   Note
   A current style for the HMI device must be activated in the runtime settings under "General > Screen > Style of the HMI device".

8. Mark the faceplate in the screen and open the events of the faceplate via register "Properties > Events".

9. Connect the "ActivateScreen" function to the event "Click", to open the screen that includes the faceplate "fpComAdvDetailS71500SEL".
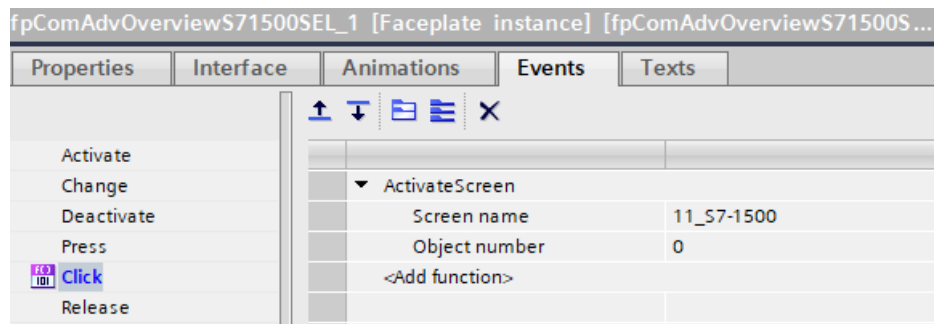
2.6 Integrating Faceplates for S7-300 / S7-400

2.6.1 Crate an HMI tag

1. Open the global library "LSEL_V15.0-0_V1-0-0" (see section 2.4.1).

2. The "SEL1200_1400" tag table is available in the folder "Master copies > HMI tags > S7-300/S7-400".

3. Insert the "SEL1200_1400" tag table by dragging and dropping into the "HMI tags" folder of the HMI operating panel.
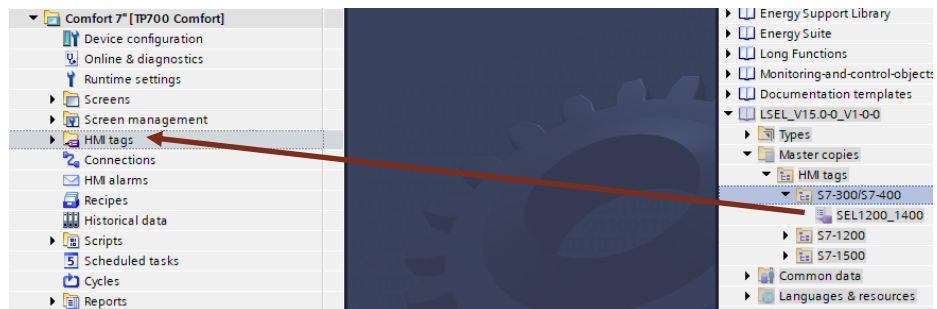
4. Open the "HMI tags" folder and double-click the "SEL1200_1400" tag table to open it in the workspace.

5. In the "Connection" column, select the HMI connection that you have created between HMI operating panel and S7-300 / S7-400.

6. In the "Address" column, set the start address of the PLC data type "typeDataS7300SEL".

7. Select the variable "DataSELModule_data" in the tag table. The properties of the "DataSELModule_data" variable are displayed in the inspector window.

8. In the "General" tab, navigate to "Settings".

9. Select the following settings:
   - "Acquisition mode": "Cyclic continuous"
   - "Acquisition cycle": 1 s

2.6.2   Faceplate "fpComAdvDetailS7300SEL"

1. Navigate in the "Project tree" to the folder "Screens".

2. Double-click on the screen in which you want to integrate the faceplate for displaying the SITOP SEL1200 / SEL1400 device data. The screen opens.

3. Open the folder "Types > 03_Faceplate" of the library "LSEL_V15.0-0_V1-0-0". There you can find the faceplates for the S7-300 / S7-400 CPUs.
    -   fpComAdvDetailS7300SEL: Faceplate for communication with S7-300 / S7-400 CPUs to graphically display device data and output current.
    -   fpComAdvOverviewS7300SEL: Faceplate for communication with S7-300 / S7-400 CPUs shows an overview of the most important device data.
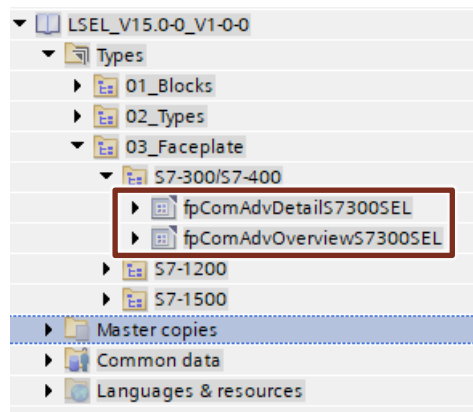
4. Insert an instance of the faceplate "fpComAdvDetailS7300SEL" by dragging and dropping into the opened screen.

5. Highlight the faceplate in the screen and open the interface of the faceplate in the "Properties > Interface" tab.

6. Connect the created HMI tag to the property "dataSEL" (category:"Data").
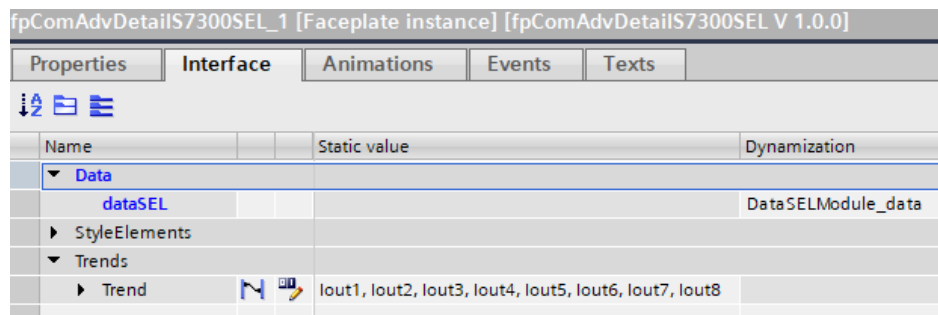
7. Create four or eight curves for the current values (depending on the hardware) via the "Trend" property (category: "Trends") with the following settings.
   Table 2-8

Parameters	Value
"Name"	• lout1, …, lout8
"Style"	• "Line color": black, brown, orange, blue, red, green, yellow, turquoise • "Mode": "Interpolated" • "Line width": of your choice • "Line style": "Solid"
"Trend values"	At least 120
"Trend Type"	"Cyclical real time"
"Source Settings"	• "Process values": Variables "outputCurrent" • "Cyclic": 1 s
"Side"	• Left
	•
	•

8. **Optional: Perform this step if you would like to adjust the style of the faceplate to your own style.**
   In the "Style Elements" category, you can find the properties to change individual styles of objects.

   – Select the desired object styles.

   – Accept the respective object style by activating the option box under the respective property.

   Note
   A current style for the HMI device must be activated in the runtime settings under "General > Screen > Style of the HMI device".

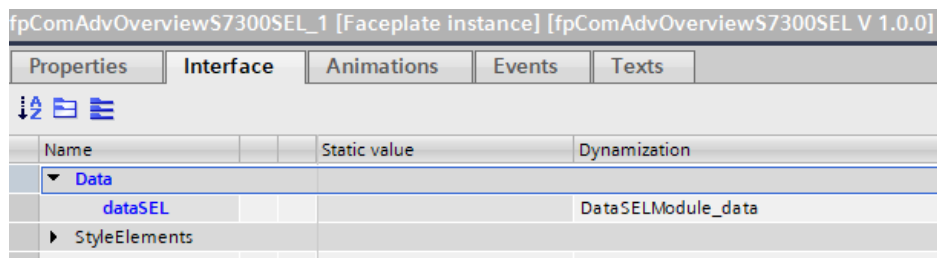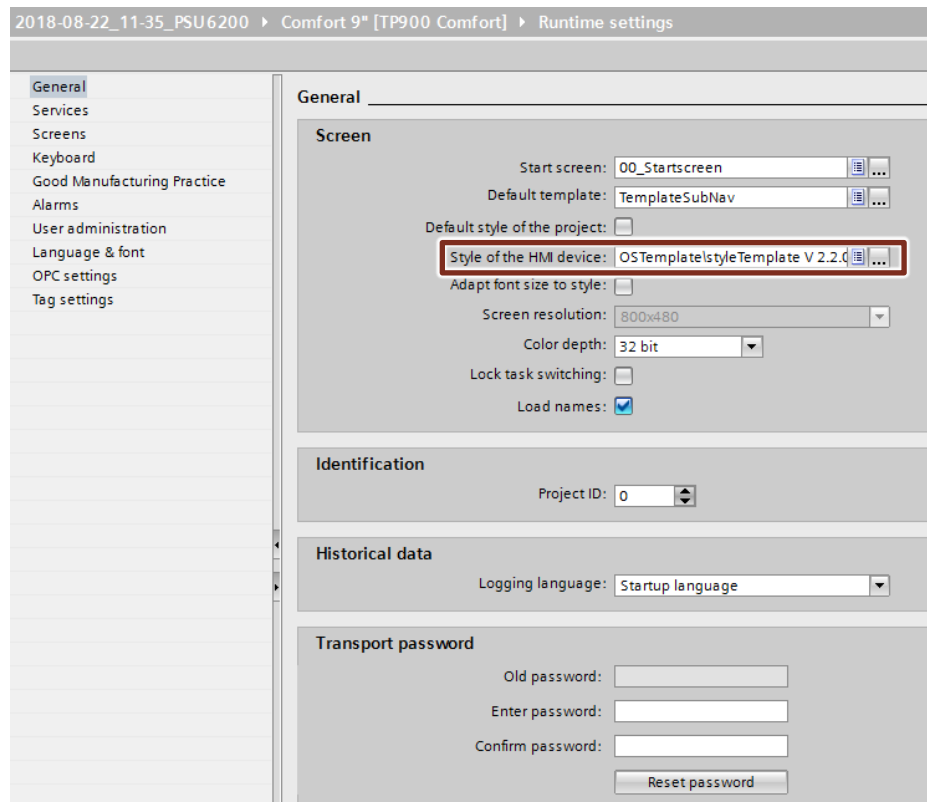### 2.6.3 Faceplate "fpComAdvOverviewS7300SEL"

1. Navigate in the "Project tree" to the folder "Screens".

2. Double-click on the screen in which you want to integrate the faceplate for displaying the SITOP SEL1200 / SEL1400 device data. The screen opens.

3. Open the folder "Types > 03_Faceplate" of the library "LSEL_V15.0-0_V1-0-0". There you can find the faceplates for the S7-300 / S7-400 CPUs.

   - fpComAdvDetailS7300SEL: Faceplate for communication with S7-300 / S7-400 CPUs to graphically display device data and output current.

   - fpComAdvOverviewS7300SEL: Faceplate for communication with S7-300 / S7-400 CPUs shows an overview of the most important device data.
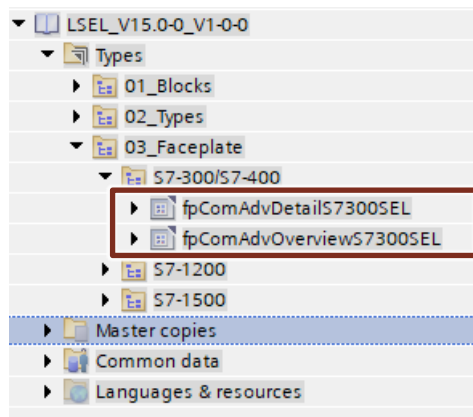
4. Insert an instance of the faceplate "fpComAdvOverviewS7300SEL" by dragging and dropping into the opened screen.

5. Highlight the faceplate in the screen and open the interface of the faceplate in the "Properties > Interface" tab.

6. Connect the created HMI tag to the property "dataSEL" (category: "Data").

7. **Optional: Perform this step if you would like to adjust the style of the faceplate to your own style.**
   In the "Style Elements" category, you can find the properties to change individual styles of objects.

   - Select the desired object styles.

   - Accept the respective object style by activating the option box under the respective property.

   Note
   A current style for the HMI device must be activated in the runtime settings under "General > Screen > Style of the HMI device".

8. Mark the faceplate in the screen and open the events of the faceplate via the register "Properties > Events".

9. Connect the "ActivateScreen" function to the event "Click", to open the screen that includes the faceplate "fpComAdvDetailS7300SEL".
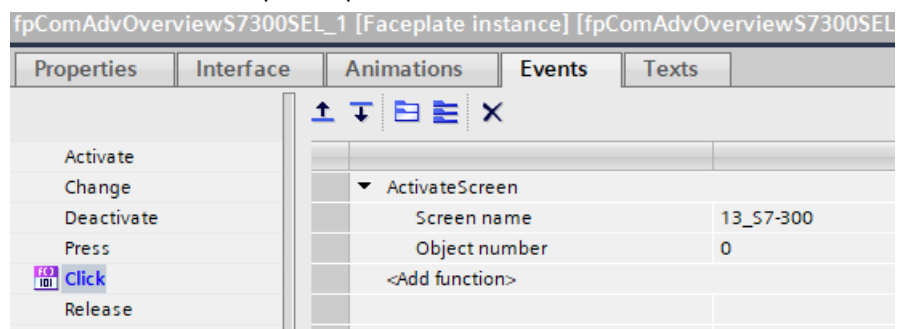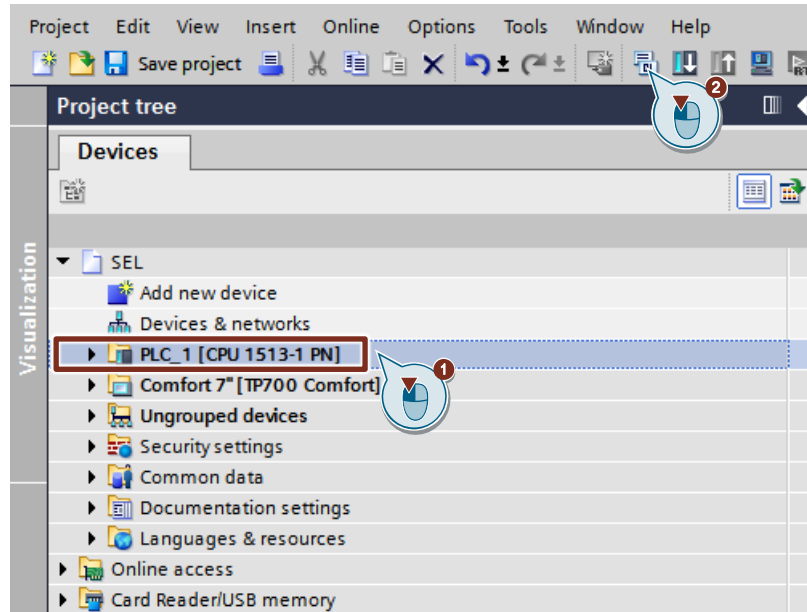
## 2.7 Compiling and Downloading

2.7.1 User program of the S7-CPU

Compiling

1. Select the S7 CPU in the "Project tree".
2. Click on the "Compile" button in the toolbar.

Downloading

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 "Download to device" button in the toolbar to load the hardware configuration and the software into the S7 CPU.
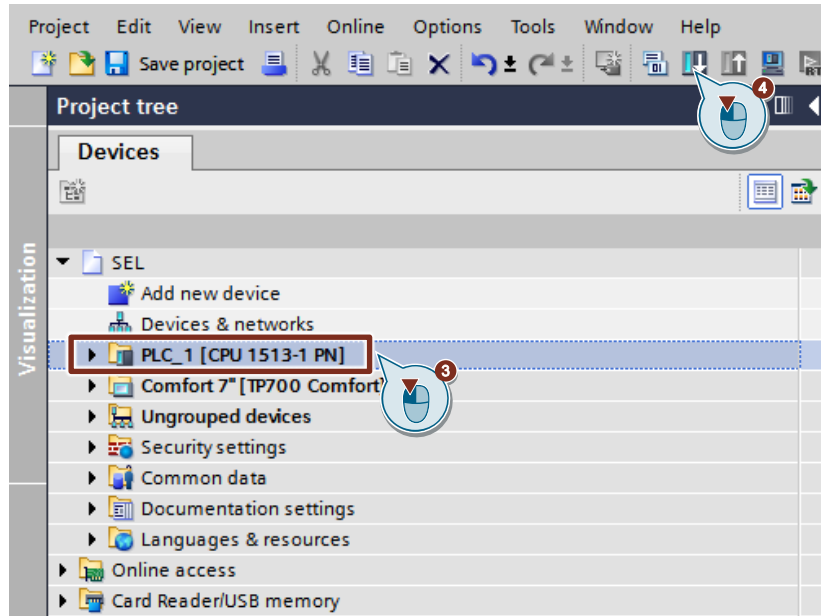
5. The "Extended download to device" or "Load preview" dialog opens automatically.
   Note
   The "Extended download to device" dialog is only opened automatically if the access path from the PG/PC to the S7 CPU has to be reset.

6. 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 card

   - Connection to interface/subnet: Subnet of the S7-CPU, e.g. PN/IE_1

7. Select the "Show all compatible devices" option.

8. Click the "Start search" button.

9. Select the S7 CPU as the target device.

10. Click the "Load" button
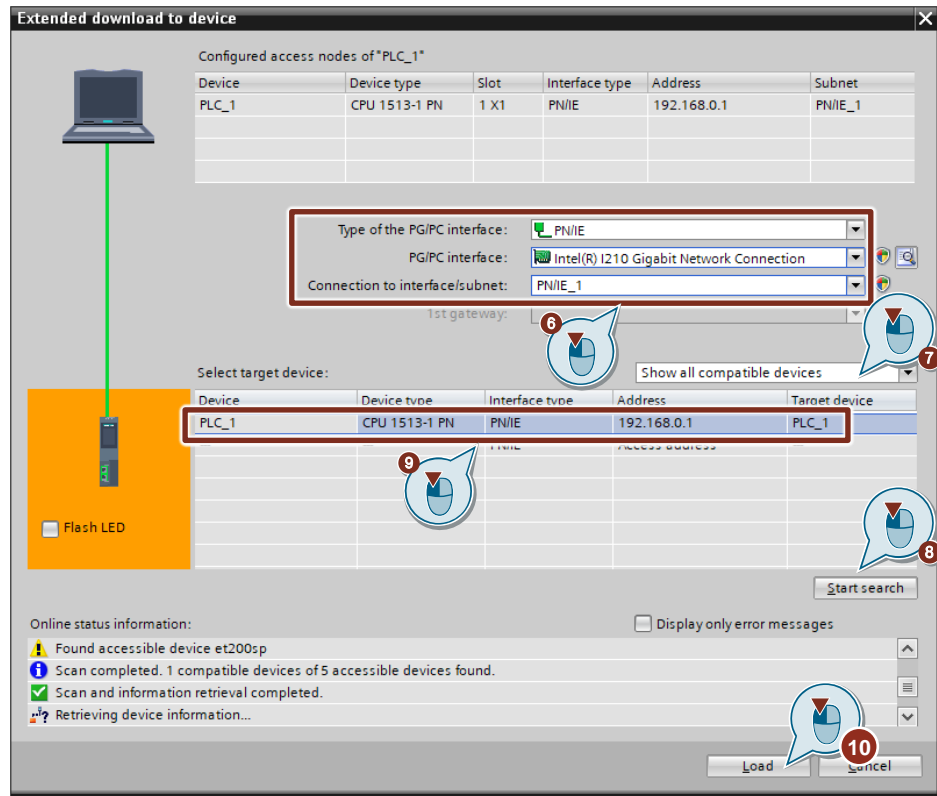
11. In the "Load preview" dialog, click the "Load" button to start the load process.
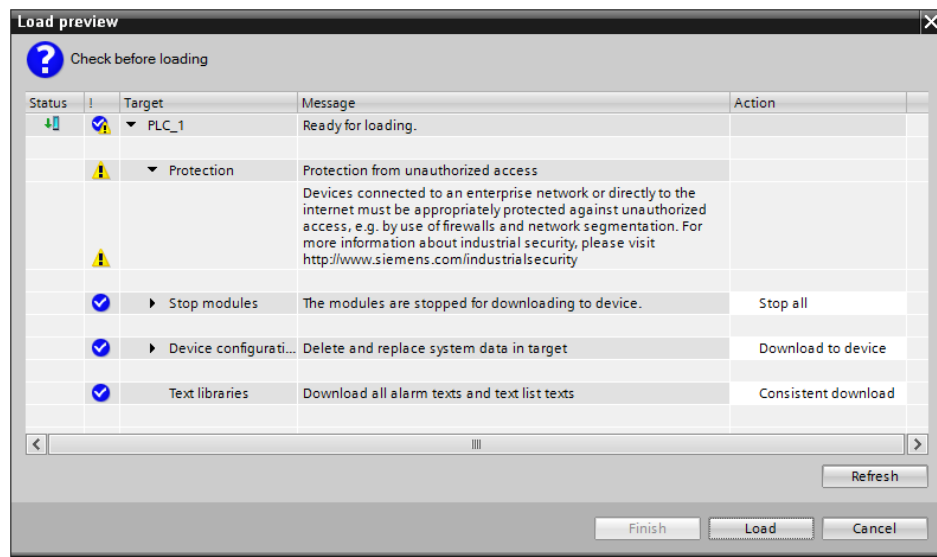
12. In the "Load results" dialog, click the "Finish" button to finish loading the results.
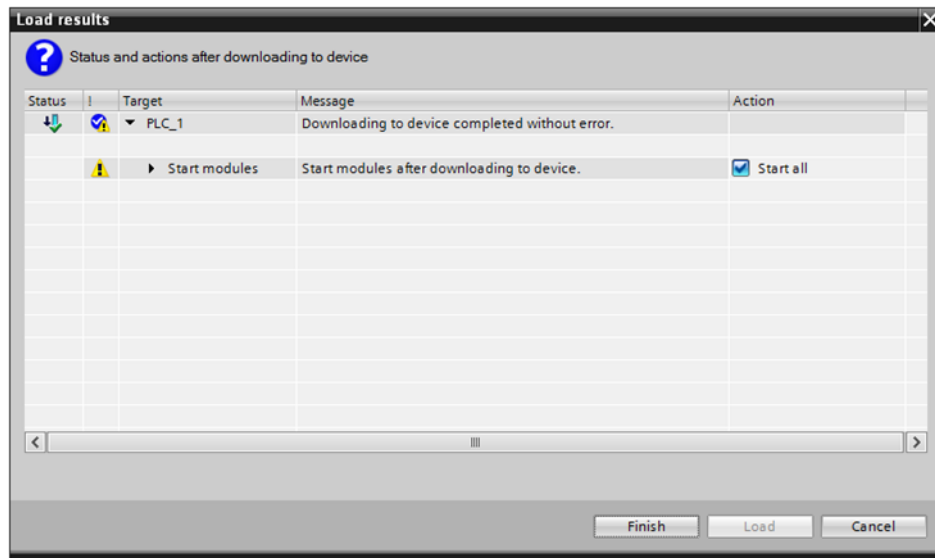
2.7.2 HMI operating device

Download the configuration to your HMI device or start the simulation.

| Note	If you only simulate the device, make sure that the PG/PC interface is set correctly.
	Follow the following link of the FAQ "Why is communication between the Runtime Simulation and the S7-1200/S7-1500 not possible if the PG/PC interface is set incorrectly?"
	https://support.industry.siemens.com/cs/ww/en/view/38717202

Compiling

1. Select the HMI operating device in the "Project tree".
2. Click on the "Compile" button in the toolbar.
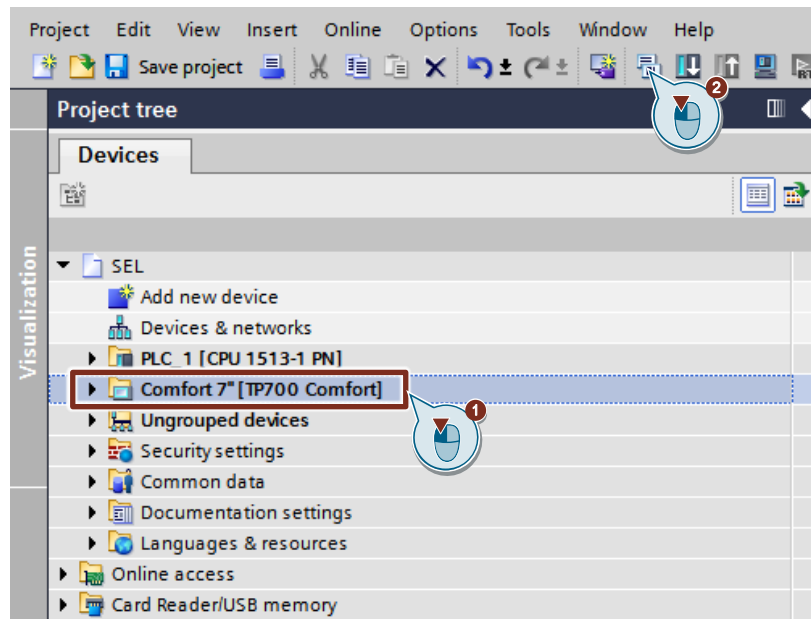
Downloading

1. Make sure that your engineering PC and the HMI operating device are connected to the same subnet.

2. Set the IP address and subnet mask that you have entered in the hardware configuration on the HMI operating device ("Control Panel > Transfer Settings > Properties > PN_X1").

3. Switch the HMI operating device to transfer mode via the "Start Center".

4. Select the HMI operating device in the "Project tree".

5. Click on the "Download to device" button in the toolbar to load the project engineering into the HMI operating device.
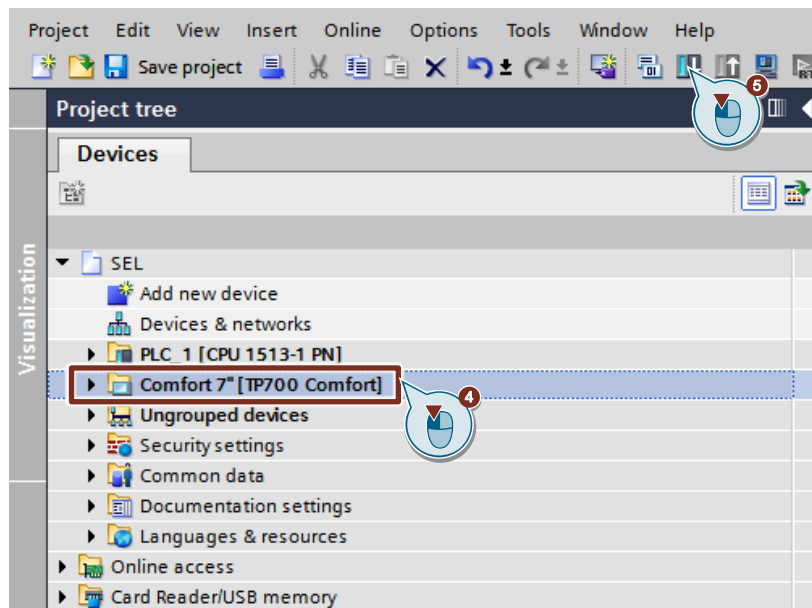

6. The "Extended download to device" or "Load preview" dialog opens automatically.
   Note
   The "Extended download to device" dialog is only opened automatically if the access path from the PG/PC to the HMI operating device has to be reset.

7. In the "Extended download to device" dialog, make the following settings to access the HMI device via TCP/IP:

   - Type of PG/PC interface: PN/IE

   - PG/PC interface: PG/PC network card

   - 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 target device.

11. Click the "Load" button
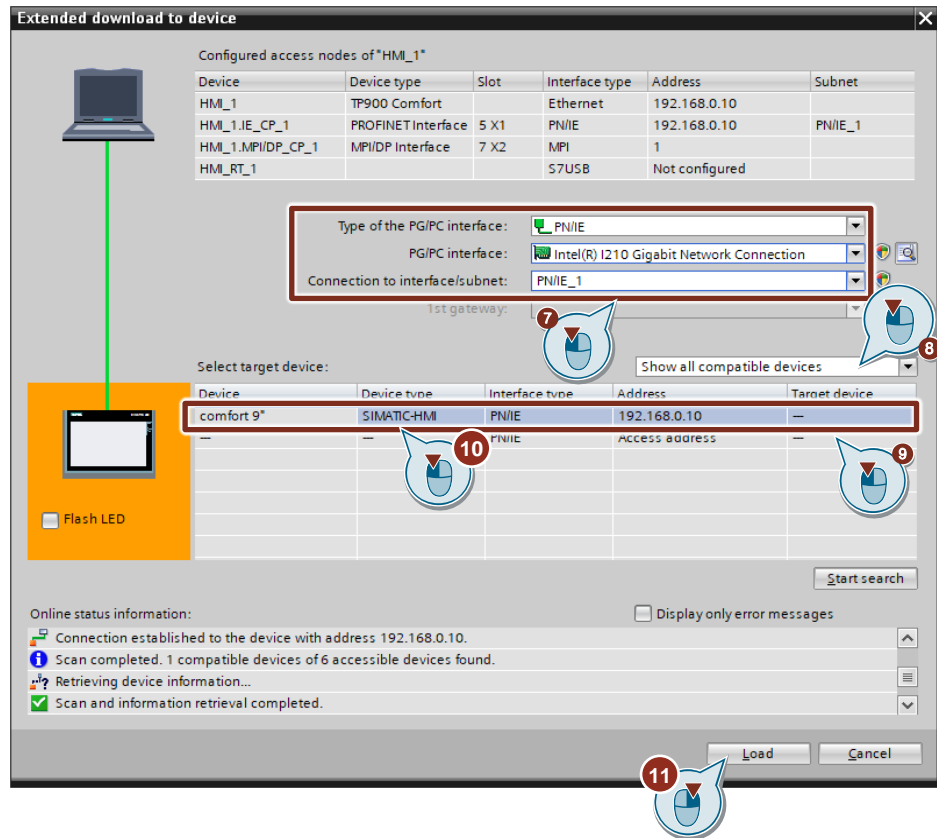
12. In the "Load preview" dialog, click the "Load" button to start the load process.
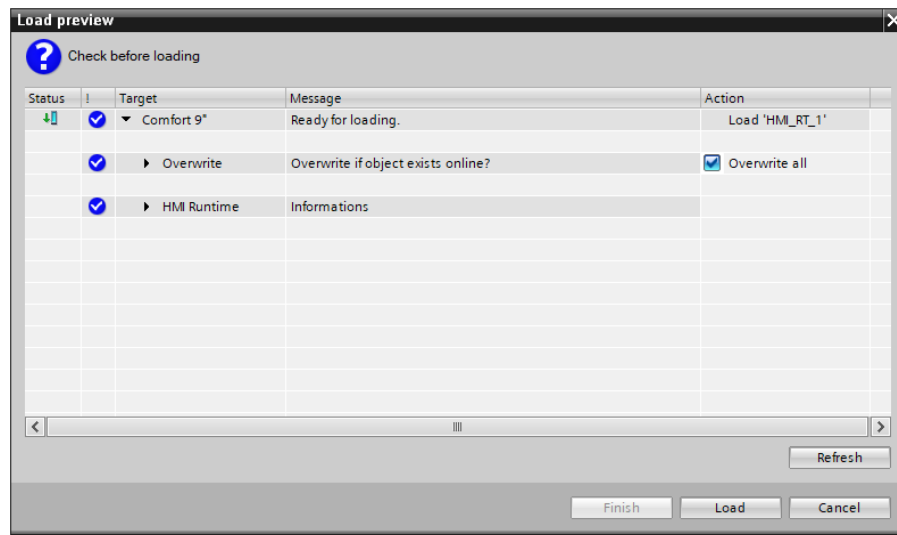
13. Runtime on the HMI device.

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 operating device in the project navigation.

5. In the toolbar, click on the "Start simulation" button.
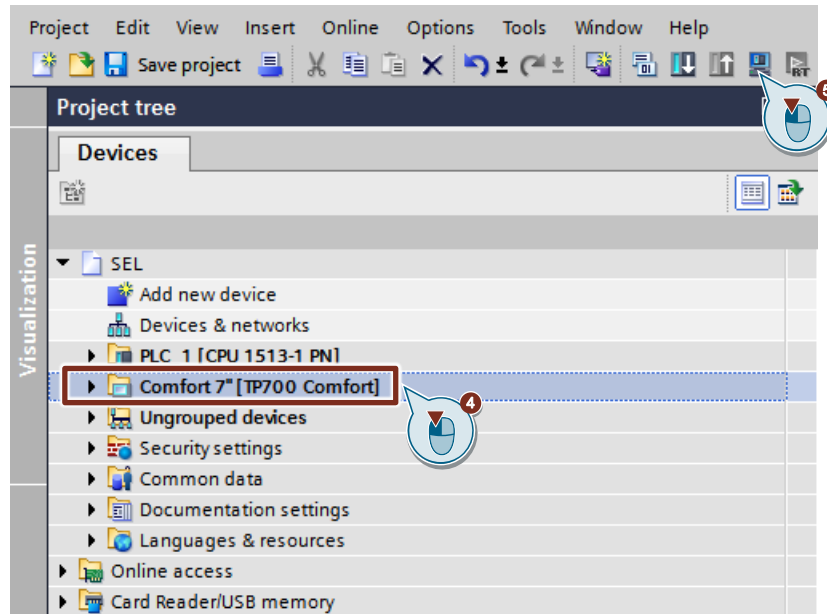
6. The runtime simulation is started.

3 Operation

3.1 Faceplate "fpComAdvDetailS7xy00SEL"
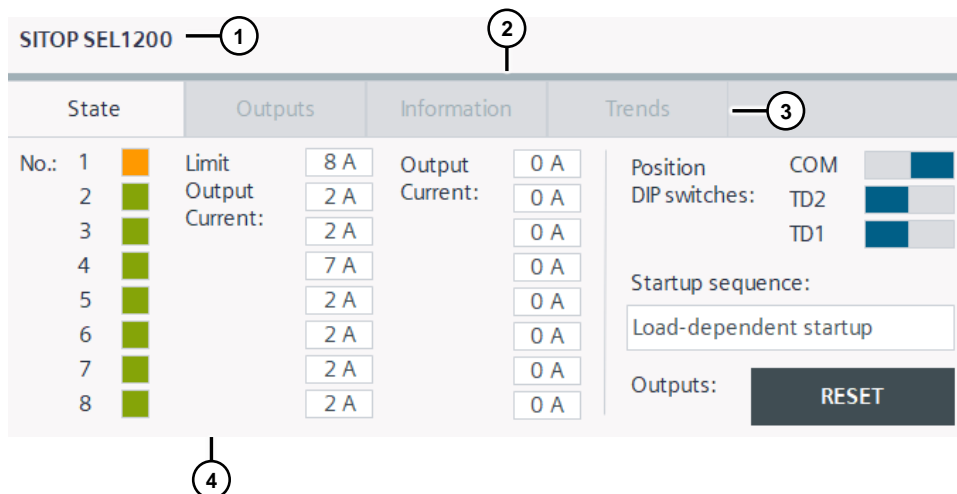
3.1.1 Overview

Figure 3-1

Table 3-1

No.	Area	Description
1	Header area	Displays "SITOP + <Device name>" as header
2	Status area	Status line for colored display of the current communication status
3	Navigation area	Navigation between the four data areas • 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 area

3.1.2 Header area

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

3.1.3 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 3-2

State	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

3.1.4 Navigation area

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
- Trends: Current curves of the outputs

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 3-3

| Active topic area	Inactive topic area
Status	Status

3.1.5 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 "Status" information area ("State") displays the status parameters of the SITOP SEL1200 / SEL1400.

Figure 3-2
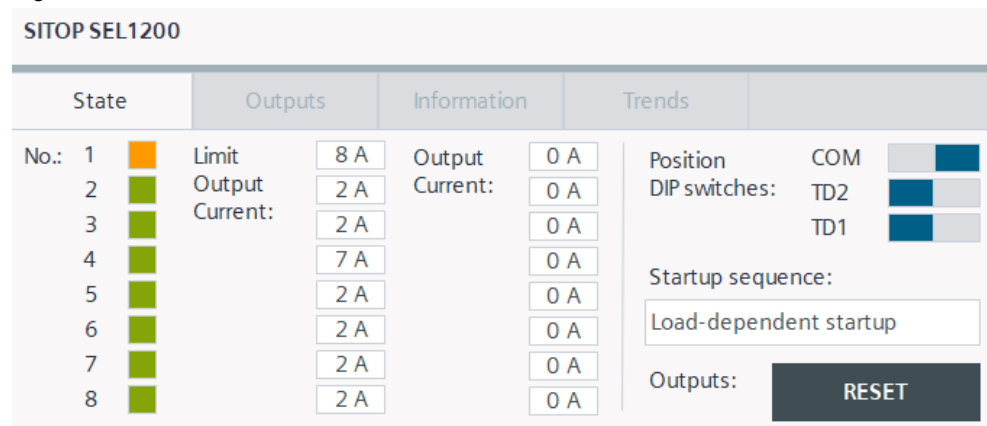
The following status parameters are displayed:

- Color status of the outputs: see Table 3-5
- Current limit value of the outputs
- DIP switch position
  - COM
  - TD1
  - TD2
- Startup sequence (Table 3-4)

The text list "StartupSequence" ([Table 3-4](#)) contains the textual representation of the startup sequence, which you set via the dip switches "TD1" and "TD2" of an output. Depending on the state of the variable "startup", the associated text is displayed via a symbolic I/O field.

Table 3-4

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. Depending on the state value of the variable "stateOutput<x>" the background color is varied, and a "flashing" animation is executed.

Table 3-5

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 button "Output <x>". <x> is the output number.

Figure 3-3

The following output parameters are displayed:

- Color and text status of the output ("State"): see Table 3-5 and Table 3-6
- Reason switch off ("Reason switch off"): see Table 3-7
- Output current ("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 variable "stateOutput<x>", the associated status text is displayed via a symbolic I/O field.

Table 3-6

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

The text list "OutputSwiched0ff" contains the possible shutdown reasons. Depending on the state of the "reasonOutputSwitchedOff<x>" variable, the associated reason for shutdown is displayed via a symbolic I/O field.

Table 3-7

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 "Information" displays the informative and static device data of the SITOP SEL1x00.

Figure 3-4

You see the following device information:

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

Trends

The information area "Curves" ("Trends") shows a trend display which graphically displays the output currents of the SITOP SEL1x00.

Figure 3-5
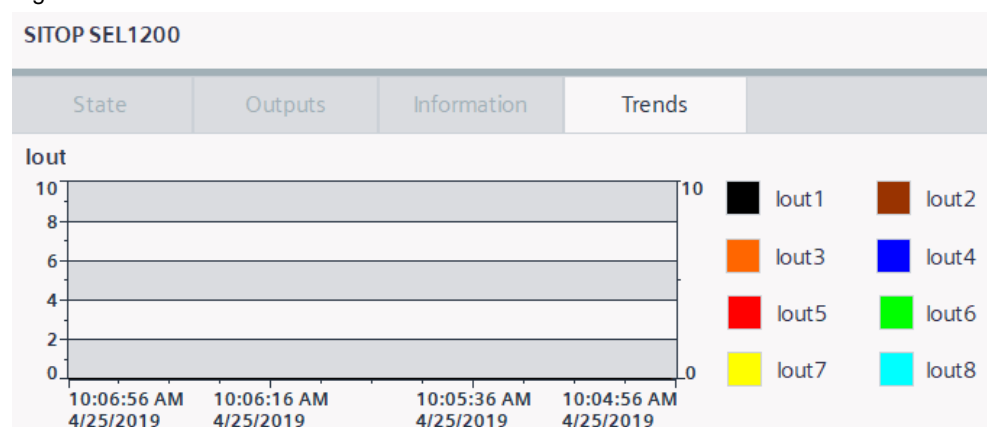
By default, the trend lines have the following colors:

- Current ("Iout1"): black (RGB: 0, 0, 0)
- Current ("Iout2"): brown (RGB: 153, 51, 0)
- Current ("Iout3"): orange (RGB: 255, 102, 0)
- Current ("Iout4"): blue (RGB: 0, 0, 255)
- Current ("Iout5"): red (RGB: 255, 0, 0)
- Current ("Iout6"): green (RGB: 0, 255, 0)
- Current ("Iout7"): yellow (RGB: 255, 255, 0)
- Current ("Iout8"): turquoise (RGB: 0, 255, 255)
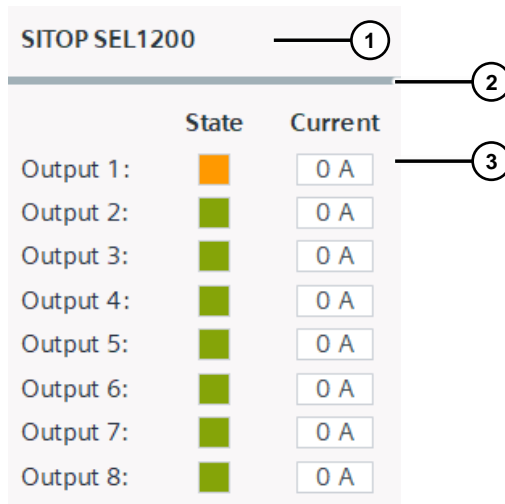
3.2 Faceplate "fpComAdvOverviewS7xy00SEL"

3.2.1 Overview

Figure 3-6

Table 3-8

No.	Area	Description
1	Header area	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 section 3.1.3.
3	Information area	Area for displaying the most important device data: • Color status of the outputs ("State"): see Table 3-5 • Output currents of the outputs ("Current")

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

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

4 Error handling

4.1 Status display FB "LSEL_SignalEvaluationS71500" and FB "LSEL_SignalEvaluationS71200".

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 frame content	High level and low level could not be properly detected so that an error occurred when evaluating the frame 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	Frame unknown	Permissible content type: 0 to 3
16#8007	Communication error or device replacement	Article number change detected

4.2 Display of diamonds ("#####") in the image module

Figure 4-1

If diamonds ("#####") are displayed in the screen block for device data, there is a communication problem between the HMI operating device and the S7 CPU.

Check the following items:

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

4.3 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.

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- Repair services
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- Retrofitting and modernization services
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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 Apple iOS, Android and Windows Phone:
support.industry.siemens.com/cs/ww/en/sc/2067

5.2 Links and literature

Table 5-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109763709
\3\	SIMATIC STEP 7 Basic/Professional V15 and SIMATIC WinCC V15 https://support.industry.siemens.com/cs/ww/en/view/109755202

5.3 Change documentation

Table 5-2

Version	Date	Modifications
V1.0	06/2019	First version