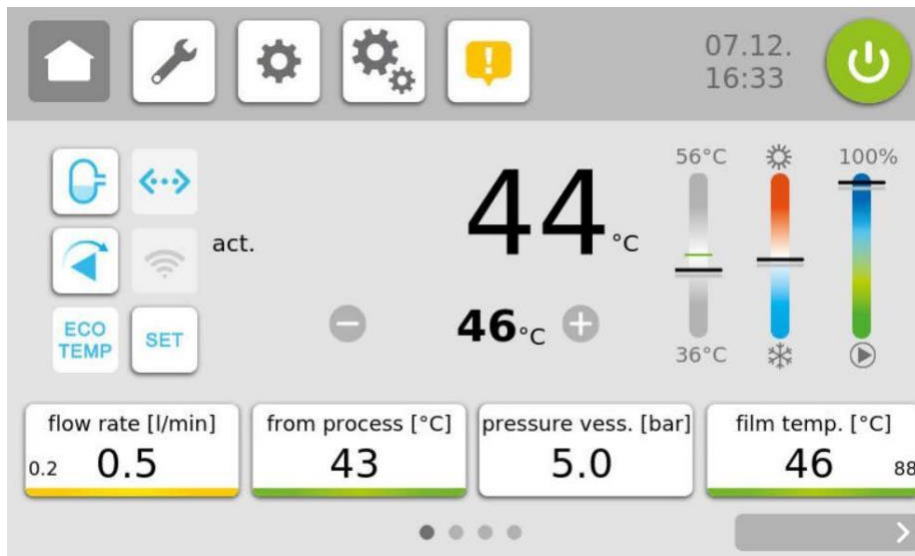


Description Data  
transmission:

Profinet



Single Smart Controller - SSC



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## Foreword

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## 1 Interface, general description

The "Single Smart Control" **SSC** (also called control device) is suitable for connection to the Profibus-DP bus system.

A gateway connector is used for connection to a Profinet network.



This makes it possible to have the controller monitored and controlled via Profinet by a master (e.g. an industrial or personal computer or a PLC).

In the following you will find the description of the Profibus interface.  
The description of the gateway can be found in appendix 1 & 2.

The sequence of a communication is always controlled by the master.  
The downstream control device operates as a "slave".  
Each control device has its own device address.

If the controller detects transmission errors or plausibility errors (e.g. range limits exceeded) it does not accept this data.  
The previously existing, valid data will continue to exist.

Controller settings:

Device address:           The controller address 1...125 is set on the controller.  
See parameter: "Adr

Baud rate:                93.75 kBaud ... 12 MBaud (with automatic detection)

**It is essential to observe the operating instructions belonging to the control unit.**

**GSD - file:**

Please order via: SINGLE Temperiertechnik GmbH, Ostring 17-19, D-73269 Hochdorf. Internet:  
[www.single-temp.de](http://www.single-temp.de)

## 1.1 Commissioning

### Note

The commissioning of the control unit with Profibus DP connection may only be carried out by trained personnel in compliance with the safety regulations.

**It is indispensable that you have profound experience in handling Profibus- DP. Please also regard our FAQ list.**

You will need the following components for commissioning:

- ◆ Connector plug for PROFIBUS connection to the control device
- ◆ PROFIBUS cable (This cable is usually already installed on site!)
- ◆ Floppy disk with GSD file
- ◆ Any configuration tool for PROFIBUS-DP

**To ensure proper operation of the controller, it is essential that you perform the following steps during commissioning:**

**PROFIBUS connection:** Connect the controller with the PROFIBUS cable.

### Set the following parameters on the controller:

Protocol" parameter      set to "Profibus DP  
 Parameter "Address"      to the required Profibus address. (Default address is2)  
 Parameter "Baud rate"    No setting possible  
    The required baud rate is automatically detected and  
    displayed. Display "ndt" = no baud rate detected.

### Diagnostic displays:

The following diagnostic displays are shown in the "Status" parameter:

Data Exchange:	The device is in data exchange mode. Communication is in order. Data exchange with the master takes place.
Wait param.:	The bus connection is recognized. The controller waits for parameterization by the master. This is done automatically.
No verb.:	The controller is not properly connected to the bus. e.g.: - There may be a wiring error present - The master not active - The protocol is not set correctly
DP HW-Err:	Error in the Profibus hardware of the controller. Send the device in for inspection. However, normal regular operation of the device is still possible. For more information, see Alarm list.

## 2 Parameter transfer

### Communication:

The master sends data to the controller.

In the opposite direction, the controller sends a response to the Profibus master. This sequence takes place cyclically and is controlled by the master.

The controller is configured using the GSD file. The following

modules are available for the SSC controller:

1. Process image: Module: "Single process data"
2. Configuration channel: Module: "Parameter channel"
3. Process image and configuration channel: Module: "Single process data + parameter".

As of software version V21/19, the following modules are implemented.

They offer extended functionalities:

4. Process image (extended): Module: "Single process data extended"
5. Process image (extended) and config. channel: Module: "Single proc. data extended + pc."

### 2.1 Process reflection

In the process image, certain parameters are transferred according to a fixed scheme.

#### 2.1.1 From the master to the controller: Transmission of setpoint 1 and control word

Byte 1	Byte 2	Byte 3
Set point High byte	Set point Low byte	Control word

Setpoint: The parameter value consists of two data bytes:

Example:	Dec.	Hex.	High-Byte	Low-Byte
Setpoint :	230	00E6	00	E6

Corresponds e.g. to 230°C or 230°F or 23.0°C depending on parameter (see parameter list of the controller).

The numerical value is treated as shown in the display.

150 -> 15.0 with comma

150 -> 150 without comma

Tax Word:	Bit 0:	Device "on" / "off"	1 = on
	Bit 1:	Unit "cool down" and "off"	1 = on
	Bit 2:	Sensor internal/external Leak	1 =
	Bit 3:	stop operation Mold emptying	external
	Bit 4*:	Setback setpoint (2nd	1 = on
	Bit 5:	setpoint) Optimization	1 = on
	Bit 6*:	—	1 = on
	Bit 7:	—	1 = on

**\*To bit 4 "Mould emptying":**

The change from "0" to "1" causes the mold to be emptied once. To trigger emptying again, the bit must be set to "0" once in the meantime.

The current device status can be read in the status of the process data. When mold emptying is complete, "Device off and mold emptying off" is reported as the status.

**\*To bit 6 "Optimization**

The change from "0" to "1" causes a one-time optimization.

To trigger an optimization again, the bit must be set to "0" once in the meantime.

If bit 6 is set to "0", a possibly running optimization is aborted.

The current optimization status can be read in the status of the process data.

**2.1.2 From the control device to the master: Transmission of the process data**

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
<b>Status default</b>	<b>Actual value, current. Control sensor</b> High byte	<b>Actual value, current. Control sensor</b> Low byte	<b>Actual value, return</b> High Byte	<b>Actual value, return</b> Low Byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
<b>Flow rate</b> High byte	<b>Flow rate</b> Low byte	<b>Print</b> High byte	<b>Print</b> Low byte	<b>Power</b> High byte	<b>Power</b> Low byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
<b>Film temperature</b> High Byte	<b>Film temperature</b> Low Byte	<b>Output level</b> 0x9C...0x64	<b>Alarms 1</b>	<b>Alarms 2</b>	<b>Status</b>

**Definition "Status default":**

indicates whether a range error occurred when writing the setpoint value has occurred.

0 = Set point value OK.

1 = Setpoint specification faulty

**Definition "Alarms 1":**

Bit 0 = collective alarm (alarms marked with \* are not included in the collective alarm)

Bit 1 = Alarm 1 \*

Bit 2 = ---

Bit 3 = Alarm pump (motor protection switch has tripped, phase, direction of rotation)

Bit 4 = Alarm level, level

Bit 5 = Alarm flow / flow monitor Bit 6 =

System error

Bit 7 = Optimization error \*

**Definition "Alarms 2":**

Bit 0 = ---

Bit 1 = ---

Bit 2 = Alarm film temperature

Bit 3 = Alarm sensor break (current control

sensor) Bit 4 = Alarm pressure too high

(option)

Bit 5 = ---

Bit 6 = Almost empty \*

Bit 7 = ---

**Definition "Status":**

Bit 0 = Device on / off	1 = on
Bit 1 = Device cool down and off	1 = on
Bit 2 = Internal/external sensor	1 = external
Bit 3 = Leakage stop mode	1 = on
Bit 4 = Mold emptying	1 = on
Bit 5 = Setback setpoint (2nd setpoint)	1 = on
Bit 6 = Optimization	1 = on
Bit 7 = Manual / remote operation	1 = hand

2.1.3 From the master to the controller:

**Transmission example for transmission of setpoint 1 and control word**

Prerequisite: Parameter "Unit" = °C and not °F or 0.1°C

Byte 1 + 2: A setpoint of 50°C is to be transmitted to the control device  
Setpoint:50 decimal = 0x0032 hexadecimal as 16 bit integer value

Byte 3: The control is to be switched on (bit 0 = 1).

Byte 1	Byte 2	Byte 3
<b>Setpoint High Byte</b>	<b>Set point low byte</b>	<b>Control word</b>
0x00	0x32	0x01

**Response from the control device to the master: Transmission of the process image**

The controller shows the following parameter values (parameter unit = °C):

Byte 1: Status preset: The last preset was OK  
 Byte 2 + 3: Actual value: 55 (decimal) = 0x0037 (hexadecimal as 16 bit integer value)  
 Byte 4 + 5: Actual value return: 50 (dec.) = 0x0032(hex.)  
 Byte 6 + 7: Actual value flow: (only if available) 0 (dec.) = 0x0000 (hex.) Byte 8 + 9:Actual value pressure: (onlyif available) 0 (dec.) = 0x0000 (hex.)  
 Byte 10 +11:Power: (onlyif available) 0 (dec.) = 0x0000 (hex.)  
 Byte 12 + 13: Actual value film temperature: 100 (dec.) = 0x0064 (hex.)  
 Byte 14: Output level: -33 (dec.) = 0xDF (hex. as 8bit integer value)  
 Byte 15: Alarms 1 The common alarm has responded  
 Byte 16: Alarms 2 Thefilm temperature alarm has responded.  
 Byte 17: StatusThe controller is switched on.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
<b>Status default</b>	<b>Actual value, current. Control sensor</b>	<b>Actual value, current. Control sensor</b>	<b>Actual value, return</b>	<b>Actual value, return</b>
0x00	High byte	Low byte	High Byte	Low Byte
	0x00	0x37	0x00	0x32

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
<b>Flow rate</b>	<b>Flow rate</b>	<b>Print</b>	<b>Print</b>	<b>Power</b>	<b>Power</b>
High byte	Low byte	High byte	Low byte	High byte	Low byte
0x00	0x00	0x00	0x00	0x00	0x00



Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
<b>Film temperature</b> High Byte	<b>Film temperature</b> Low Byte	<b>Output level</b> -100...+100	<b>Alarms 1</b>	<b>Alarms 2</b>	<b>Status (read)</b>
0x00	0x64	0xDF	0x01	0x04	0x01

## 2.2 Configuration channel

Each parameter can be addressed individually via the configuration channel. The master in the Profibus- DP has the possibility to read out all available data of the controllers and to change them, if permitted.

The command or parameter transfer takes place in both directions via defined data blocks.

### Terms

Command code **[BC]**: "tells" the device what it has to "do" (1 byte)  
 Parameter code **[PC]**: designates each individual parameter that can be called up in the controller (1 byte)  
 Parameter value **[PW]**: indicates the value of a parameter (3 bytes)

### Number ranges

Command code **[BC]**: 0x10, 0x20, 0x21  
 Parameter code **[PC]**: 0x00...0xFF  
 Parameter value **[PW]**: the parameter value (16 bit integer) is composed of from the pure numerical value **PWH** and **PWL** and the decimal place **PWK**

Parameter value high byte **[PWH]**  
 Parameter value low byte **[PWL]**  
 Decimal place **[PWK]**

### 2.2.1 Configuring the parameters via the configuration channel.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
<b>Sequence number</b>	<b>always:</b>	<b>Command</b>	<b>always:</b>	<b>Parameter code</b>	<b>Parameter value</b>	<b>Parameter value</b>	<b>Decimal place</b>
0x00 ... 0xFF	0x01	<b>code BC</b> 0x10, 0x20 or 0x21	0x00	<b>PC</b> 0x00 ... 0xFF	<b>PWH</b> High-Byte	<b>PWL</b> Low byte	<b>PWK</b> 0x00 ... 0xFF

### Byte 1

**Sequence number:** The master should prefix each new request with a new sequence number.

Request This is repeated by the controller in the response. So it is possible to assign and response to each other.

**Byte 2:** Always 0x01

### Byte 3

**Command code, BC:** 0x10 : Read parameter  
0x20 : Write parameter  
0x21 : Write parameters and save them power-failure-proof  
The power-failure-proof semiconductor memory (EAROM, EEPROM) allows a maximum of 1,000,000 write cycles.

**Byte 4:** Always 0x00

### Byte 5

**Parameter code, PC:**

**Request:**

Addresses the parameter to be configured (see table).

**Response:**

If the reading process from the controller was error-free, byte 5 in the response contains of the controller the parameter code PC.

If the write operation to the controller was error-free, byte 5 contains the value 00H (acknowledge).

In case of faulty communication, the following error messages may occur in byte 5:

03 H- Procedure error (invalid command code).

Device is not in remote operation

04 H -Range specification not observed (value too large or toosmall)

05 H - Byte 2≠ 0

-the addressed parameter is a "readonly parameter" 08 H

- parameter code invalid

09 H- command execution not possible

(e.g. optimization cannot be triggered) FEH- error

when writing to the mains fail-safe memory FFH- general error

**Byte 6, 7 and 8**

**Parameter value:** Bytes 6, 7 and 8 contain the parameter value **PWH** and **PWL** and the decimal place **PWK**.

The parameter value consists of three data bytes:  
2 data bytes (numerical value), 1 data byte (decimal place).

Examples:	Dec.	Hex.	PWH	PWL	Decimal place
Actual value (°C or °F):	215	00D7	00	D7	00
Set point (°C or °F):	230	00E6	00	E6	00
Output level, "cool" (%)	-16	FFF0	FF	F0	00
Setpoint ramp (°C/min):	2,2	0016	00	16	01

The parameter value is calculated as follows:  
Dec.: 2,2 = 22 with one decimal place  
Hex.: = 0016 (PWH PWL)  
= 01 (1 decimal place)

Negative values:  
Formation by the binary 2's complement.

## 2.2.2 Parameter codes (Table 1)

Parameter	Para-Code	Read Write	Other
<b>Cockpit</b>			
1. set point	0x21	RW	
<b>Expert</b>			
Actual value temperature	0x10	RO	
Return temperature	0x12	RO	
Flow temperature	0x13	RO	
Film temperature	0x14	RO	
current output level	0x60	RO	
Flow rate	0x15	RO	
Supply pressure	0x16	RO	
Flow rate	0x17	RO	
<b>Device functions</b>			
Alarm value	0x38	RW	
Leakage stop mode On/Off	0xA7	RW	
Remote On/Off	-		
Mould emptying active	-		
Pump follow-up	0xD4	RW	Cooling down before switching off
Pump control on/off	0xB3	RW	An=1
<b>Basic settings</b>			
Language	0xD9	RW	
Unit	0x1B	RW	
Keyboard lock	0x85	RW	
Lock code	-		
Factory access single	-		
Pressure unit	0xE5	RW	Option
Flow unit	0xE6	RW	Option
<b>Device control</b>			
Filling	0xD0	RW	
Direct cooling	0x94	RW	
Shutdown temperature	0x93	RW	
Emptying time	0xA1	RW	
Setpoint source	0xD6	RW	Option
Aquatimer start time	0xA9	RW	
Aquatimer	0xA0	RW	
Filling time monitoring	0xB0	RW	
Reclosing lockout	0x90	RW	Emergency-Off
External sensor	0xD7	RW	Option On=1 Off=0
Actual value output upper value	0x87	RW	
Actual value output lower value	0x89	RW	

<b>Temperature control</b>				
2. set point		0x22	RW	
Output level limitation heating		0x64	RW	
Output level limitation cooling		0x69	RW	
XP - Heating		0x40	RW	
TV - Heating		0x41	RW	
TN -Heating		0x42	RW	
XP - Cooling		0x50	RW	
TV - Cooling		0x51	RW	
TN - Cooling		0x52	RW	
Switching hysteresis heating / cooling		0x46	RW	
Switching cycle time heating		0x43	RW	
Switching cycle time cooling		0x53	RW	
Upper set point limit		0x2C	RW	
lower setpoint limit		0x2B	RW	
System closure temperature		0xA2	RW	
Setpoint ramp-increasing		0x2F	RW	
Setpoint ramp-falling		0x2E	RW	
Switching hysteresis Switch-on cooling		0x5A	RW	Only for 2-point cooling
Switching hysteresis Switching off Cooling		0x59	RW	Only for 2-point cooling
Cascade control		0x33	RW	
<b>Offset values</b>				
Offset internal temperature sensor		0xAB	RW	
Offset external temperature sensor		0xAC	RW	
Offset film temperature sensor		0xAF	RW	
Offset return sensor		0xAD	RW	
Offset flow sensor		0xAE	RW	
Analog values 4..20mA/0..10V		0x84	RW	
Flow offset		0x8E	RW	Option
<b>Alarms and limits</b>				
Alarm1 configuration		0x34	RW	
Film temperature limit		0x39	RW	
Alarm forward		0x3A	RW	
Alarm Flow		0x3B	RW	
Limit value return		0x3C	RW	
Alarm $\Delta T$		0xA3	RW	
Alarm pressure too high		0x3E	RW	
Alarm pressure low		0x3F	RW	
<b>Communication</b>				
Protocol		-		
Address		-		
Baud rate		-		Serial only
Data format		-		
Status		-		

<b>Pump control</b>				
Pump control selection		0xB1	RW	
Fixed set point		0xB2	RW	
Desired flow rate value		0xE7	RW	
Pressure limitation		0xB8	RW	
Deviation dT		0xB4	RW	
XP Flow rate		0xB5	RW	
Tv flow rate		0xB6	RW	
Tn Flow rate		0xB7	RW	

**Parameter code (Table 2)**

<b>Other parameters</b>				
<b>Parameter</b>		<b>Para-Code</b>	<b>Read Write</b>	<b>Other</b>
act. Actual value temperature		0x10	RO	
act. Set point		0x20	RO	
Device on/off		0x8F	RW	
Device type		0x01	RO	
SW version		0x02	RO	

### 2.2.3 Transmission example to configuration channel, command code 10 H

The controller should send the parameter (actual value, 10 H) to the master. The actual value has the value of 225 degrees C. 225 (Decimal) = 0xE1 (Hex)

<b>Master to controller:</b>	<b>Dec.</b>	<b>Hex</b>
sequence number:	1	0x01
always:	1	0x01
parameters:	16	0x10
always:	0	0x00
Parameter code (actual value):	16	0x10
Parameter value (high byte):	0	0x00
Parameter value (Low -Byte):	0	0x00
Decimal place:	0	0x00

Transmission to the controller: 0x01, 0x01 0x10, 0x00, 0x10, 0x00, 0x00, 0x00

<b>Control device to master:</b>	<b>Dec.</b>	<b>Hex</b>
sequence number of the request:	1	0x01
always:	1	0x01
parameters:	16	0x10
always:	0	0x00
Parameter code (actual value):	16 *)	0x10
Parameter value (high byte):	0	0x00
Parameter value (Low -Byte):	225	0xE1
Decimal place:	0	0x00

Transmission to master: 0x01, 0x01 0x10, 0x00, 0x10, 0x00, 0xE1, 0x00

\*) Repeat PC = 16 because the read operation was error-free.

### 2.2.4 Transmission example to the configuration channel, command

code 20 H The controller receives the command :  
"Transfer parameter XP-Heating (parameter code: 40H, parameter value: 5.0 %) to the data memory (RAM)".

<b>Master to controller:</b>	<b>Dec.</b>	<b>Hex</b>
sequence number:	2	0x02
always:	1	0x01
Command code:	32	0x20
always:	0	0x00
Parameter code (xp-heat)	64	0x40
Parameter value (high byte):	0	0x00
Parameter value (Low -Byte):	50	0x32
Decimal place:	1	0x01

Transmission to the control device: 0x02, 0x01, 0x20, 0x00, 0x40, 0x00, 0x32, 0xFF

<b>Control device to master:</b>	<b>Dec.</b>	<b>Hex</b>
sequence number of the request:	2	0x02
always:	1	0x01
Command code:	32	0x20
always:	0	0x00
Parameter code:	0 *)	0x00
Parameter value (high byte):	0	0x00
Parameter value (Low -Byte):	0	0x00
Decimal place:	0	0x00

Transmission to the master: 0x02, 0x01, 0x20, 0x00, 0x00, 0x00, 0x00

\*) Has the controller "understood" the command of the master,



it responds with the parameter code PC = 00 because the write operation was error-free.



In case of transmission or other (e.g. formal) errors, the controller responds at this point with a corresponding error code.

## 2.2.5 Transmission example to configuration channel, command code

21 H The controller receives the command:

"Accept parameter SP1 = 200 °C (setpoint1, parameter code: 0x21) and save. mains fail-safe".

<b>Master to controller:</b>	<b>Dec.</b>	<b>Hex</b>
sequence number:	3	0x03
always:	1	0x01
Command code:	33	0x21
always:	0	0x00
Parameter code (SP1):	33	0x21
Parameter value (high byte):	0	0x00
Parameter value (Low -Byte):	200	0xC8
Decimal place:	0	0x00

Transmission to the controller: 0x03, 0x01, 0x21, 0x00, 0x21, 0x00, 0xC8, 0x00

<b>Control device to master:</b>	<b>Dec.</b>	<b>Hex</b>
sequence number of the request:	3	0x03
always:	1	0x01
Command code:	33	0x21
always:	0	0x00
Parameter code:	0 *)	0x00
Parameter value (high byte):	0	0x00
Parameter value (Low -Byte):	0	0x00
Decimal place:	0	0x00

Transmission to the master: 0x03, 0x01, 0x21, 0x00, 0x00, 0x00, 0x00

\*) Has the controller "understood" the command of the master, it responds with the parameter code PC = 00 because the write operation was error-free. In case of transmission or other (e.g. formal) errors, the controller responds at this point with a corresponding error code.

## 2.3 Process image and configuration channel

Process image and configuration channel can also be transmitted simultaneously. For this purpose, the bytes of the configuration channel are appended to those of the process image.

### 2.3.1 Master to controller:

Byte 1	Byte 2	Byte 3
<b>Set point</b> High byte	<b>Set point</b> Low byte	<b>Control word</b>

Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
<b>Sequence number</b>	<b>always:</b> 0x01	<b>Command code BC</b>	<b>always:</b> 0x00	<b>Parameter code PC</b>	<b>Parameter value PWH</b> High byte	<b>Parameter value PWL</b> Low byte	<b>Decimal place PWK</b>

### 2.3.2 Control device to master:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
<b>Status default</b>	<b>Actual value, current. Control sensor</b> High byte	<b>Actual value, current. Control sensor</b> Low byte	<b>Actual value, return / external</b> High Byte	<b>Actual value, return / external</b> low byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
<b>Flow rate</b> High byte	<b>Flow rate</b> Low byte	<b>Print</b> High byte	<b>Print</b> Low byte	<b>Power</b> Low byte	<b>Power</b> Low byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
<b>Film temperature</b> High Byte	<b>Film temperature</b> Low Byte	<b>Output level</b>	<b>Alarms 1</b>	<b>Alarms 2</b>	<b>Read status</b>

Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25
<b>Sequence number</b>	<b>always:</b> 0x01	<b>Command code BC</b>	<b>always:</b> 0x00	<b>Parameter code PC</b>	<b>Parameter value PWH</b> High-Byte	<b>Parameter value PWL</b> Low byte	<b>Decimal place PWK</b>

## 2.4 Process Image (Extended)

as of software version 21/19

### 2.4.1 Actual value specification

The actual temperature value required for control can be specified via the Profibus.

#### Transmission of process data SC, extended:

#### From master to controller: transmission of setpoint, control word, recipe selection and actual value

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Set point High byte	Set point Low byte	Control word	Actual value via Profibus High Byte	Actual value via Profibus Low Byte	Reserved	Reserved

Setpoint: The parameter value consists of two data bytes:

Example:      Dec.      Hex.      High-Byte      Low-Byte

Setpoint :      230      00E6      00      E6

Corresponds e.g. to 230°C or 230°F or 23.0°C depending on parameter  
"CF" (see parameter list of the controller).

Control word:    129      81

81 Device On, actual value via

Profibus

Actual value (°C):    110      006E      00    6E

The numerical value is treated as shown in the display.

110-> 11.0 with decimal point

110-> 110 without comma

Tax Word,  
Byte 3:

Bit 0: Device "on" / "off"      1 = on

Bit 1: Device "cool down" and "off"    1 = on

Bit 2: Sensor internal / external      0 = internal / 1 = external

Bit 3: Leakage stop operation      1 = on

Bit 4: Mold emptying      1 = on

Bit 5: Setback setpoint (2nd  
setpoint)      1 = on

Bit 6: Optimization      1 = on

Bit 7: Actual value via Profibus      1 = on / 0 = actual value selection acc.  
to bit 2

Via the control word (byte 3) the parameter "external sensor" is selected as follows:

Sensor internal / external Bit 2 =	Actual value via Profibus Bit 7 =	Parameters external sensor
0	0	Off: Control on int. sensor
1	0	On: Control to ext. sensor
0	1	Sensor Profibus: Actual value from byte 4 and 5 is used for the control.
1	1	

If "Sensor Profibus" is selected as actual value, the system automatically switches to the internal actual value in the following cases.

- The transmitted value is outside the measuring range. (-30°C / 400°C)
- The Profibus connection is disturbed.



3. Remote operation is not activated.

## 2.4.2 Actual value output

The following actual temperature values can be output via the Profibus and via the analog output, depending on the preselection.

The preselection is made by means of the parameter "Actual value output / Profibus" in the menu

"Device control". Options:

**"Current control sensor"** → The current actual control value (either internal or external sensor) is displayed. output via the Profibus and analog output.

**"External sensor"** → The value of the external sensor is output via the Profibus and analog output. If the external sensor is in sensor break, the value of the internal sensor is automatically output.

**"Internal sensor"** → The internal actual value is output via Profibus and analog output.

### Transmission of process data SC, extended: From the control device to the master:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status default	Actual value, current. Control sensor High byte	Actual value, current. Control sensor Low byte	Actual value, return / external High Byte	Actual value, return / external low byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Flow rate High byte	Flow rate Low byte	Print High byte	Print Low byte	Power Low byte	Power Low byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film temperature High Byte	Film temperature Low Byte	Output level	Alarms 1	Alarms 2	Read status

Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23
Reserve 1	Reserve2	Reserve 3	Reserve 4	Reserve 5	Reserve 6

**Definition "Status default":** indicates whether a range error has occurred when writing the setpoint or actual value.

Bit 0 = 0 → Setpoint specification OK. Bit 0

= 1 → Setpoint specification faulty

**Reserve: not used at the moment.**

## 2.5 Process image (extended) and configuration channel

as of software version 29/19

Process image and configuration channel can also be transmitted simultaneously. For this purpose, the bytes of the configuration channel are appended to those of the process image.

### Master to controller:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Set point High byte	Set point Low byte	Control word	Actual value via Profibus High Byte	Actual value via Profibus Low Byte	Reserved	Reserved

Byte 6	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Sequence number	always: 0x01	Command code BC	always: 0x00	Parameter code PC	Parameter value PWH High byte	Parameter value PWL Low byte	Decimal place PWK

### Control device to master:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status default	Actual value, current. Control sensor High byte	Actual value, current. Control sensor Low byte	Actual value, return / external High Byte	Actual value, return / external low byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Flow rate High byte	Flow rate Low byte	Print High byte	Print Low byte	Power Low byte	Power Low byte

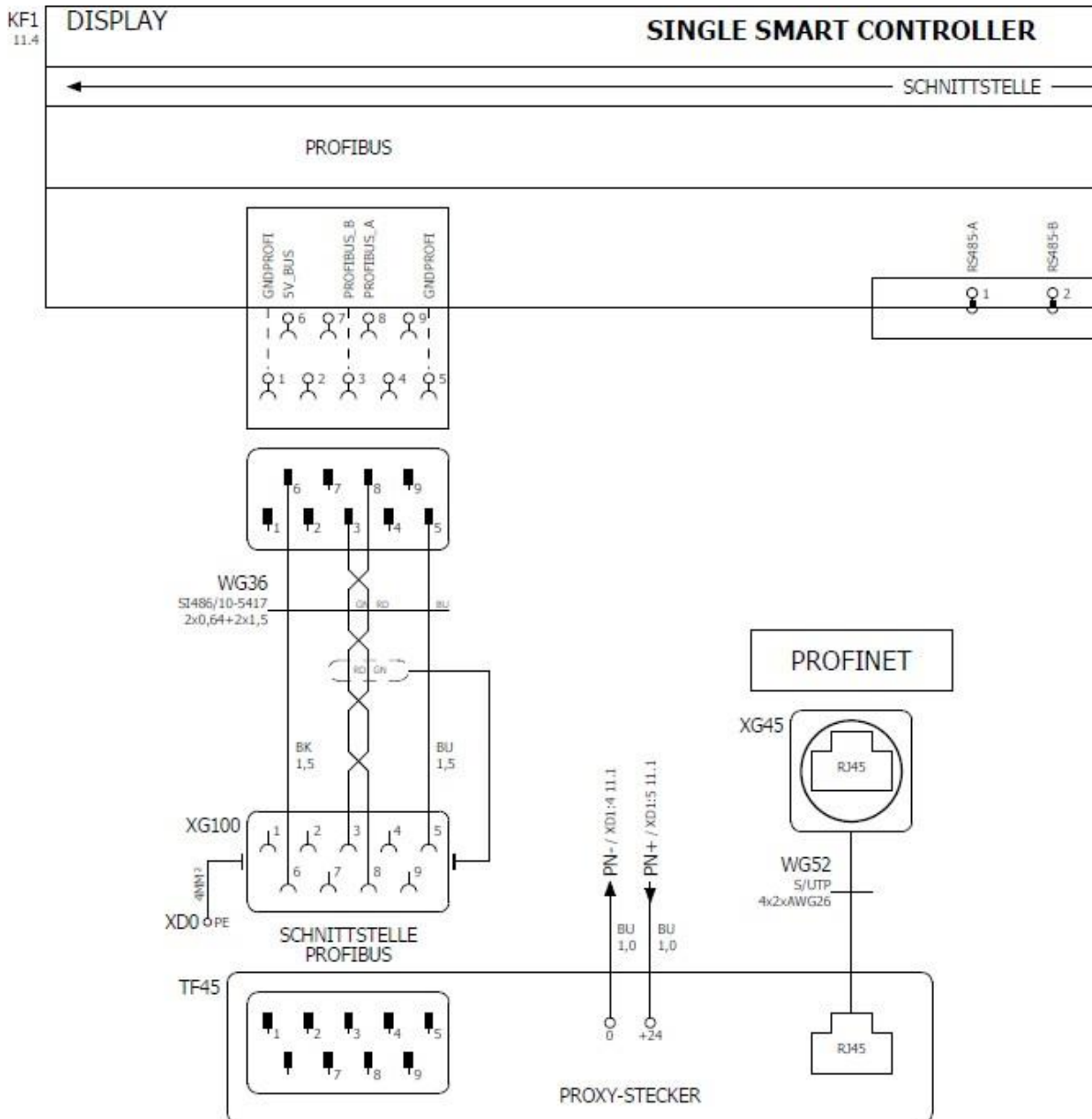
Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film temperature High Byte	Film temperature Low Byte	Output level	Alarms 1	Alarms 2	Read status

Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23
Reserve 1	Reserve2	Reserve 3	Reserve 4	Reserve 5	Reserve 6

Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31
Sequence number	always: 0x01	Command code BC	always: 0x00	Parameter code PC	Parameter value PWH High-Byte	Parameter value PWL Low byte	Decimal place PWK

### 3 Connection example

#### 3.1 Connection Profinet



**4 Attachments**

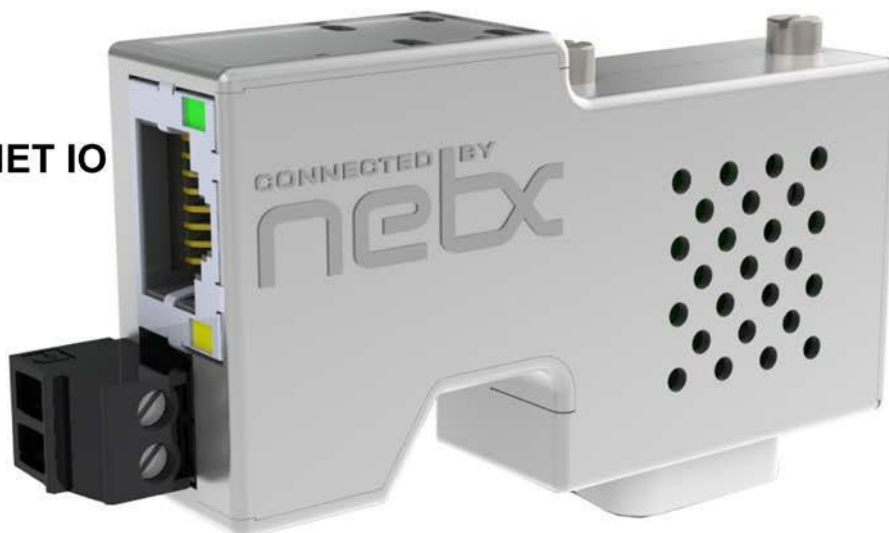
**4.1 Appendix 1 Instruction Profinet Gateway**

**4.2 Annex 2 Commissioning with TIA Portal**



User Manual  
**netLINK Proxy NL 51N-DPL**  
Installation and Hardware Description

**PROFINET IO  
Device**



**PROFIBUS DP  
Master Link**

**Hilscher Company for System Automation mbH**

**[www.hilscher.com](http://www.hilscher.com)**

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# 1 Introduction

## 1.1 About the User Manual

This user manual contains a description of the netLINK NL 51- DPL device.

### 1.1.1 Change overview

Index	Date	Chapter	Changes
1	2010-08-13	all	Created
2	2011-01-31	4.1 8.1	Dimensions Dimensions, weight, power supply
3	2013-02-01	1.2 3.3 8.1 8.2.1 8.2.2	Section related to <i>hardware, software and firmware</i> updated <i>Configuration Requirements</i> section updated: Windows® Vista and Windows® 7 added Section Technical data <i>netLINK NL 51N-DPL</i> updated. Section Technical data <i>PROFINET IO Device</i> updated. Section Technical data <i>PROFIBUS-DP Master</i> updated.
4	2014-03-10	1.3.1	<i>DVD directory structure</i> section updated.
5	2015-09-10	8.1	Section Technical data <i>netLINK NL 51N-DPL</i> updated

Table 1: Change overview

## 1.1.2 Conventions in this manual

Instructions for action, a result of an action step or hints are marked as follows:

### **Action Instructions:**

➤ <statement>

or

1. <statement>

2. <statement>

### **Results:**

<result>

### **Notes:**



**Important:** <Important note>

---



**Note:** <Note>

---



<Note where you can find more information>

---

## 1.2 Reference to hardware, software and firmware

### Hardware

Device	Revision
NL 51N-DPL	2

Table 2: Reference to hardware

### Firmware

Firmware	Version
LN30D010.NXF	1.0.22.0

Table 3: Reference to firmware

### Software

Software	Version
SyCon.net	1.310.x.x or higher

Table 4: Reference to SyCon software

## 1.3 Contents of the product- DVD

The Gateway Solution product DVD for the netLINK NL 51N-DPL contains:

- Installation program for the configuration and diagnostics software *SYCON.net* and for the *Ethernet Device Configuration Software*.
- Documentation
- Firmware
- Device description files (GSD, GSDML, EDS, ...)
- Video Audio Tutorials
- Example project for SYCON.net

### 1.3.1 Directory structure of the DVD

You will receive all documentation on this DVD in Adobe-Acrobat® Reader format (PDF).

Directory name	Description
Documentation	Documentation in Acrobat® Reader format (PDF)
Electronic Data Sheets (e. g. EDS, GSD, GSDML)	Device description files (not relevant for NL 51N-DPL)
Firmware	Loadable firmware
fscommand	Files for installation
Setups & Drivers	SYCON.net configuration software USB driver (not relevant for NL 51N-DPL) netSCRIPT Debugger Software (not relevant for NL 51N-DPL) Lua for Windows (not relevant for NL 51N-DPL)
Supplements & Examples	Example projects for SYCON.net Example files netSCRIPT (not relevant for NL 51N-DPL) Links to web pages about Modbus Device Recovery (not relevant for NL 51N-DPL)
Training & Podcasts	Commissioning videos Presentation on netSCRIPT (not relevant for NL 51N-DPL)

Table 5: Directory structure of the DVD

## 1.3.2 Documentation overview

The following documentation overview provides information on which other manuals you can find further information on which contents.

### Documentation for users



**Note:** All documents listed below can be found on the product DVD in the `Documentation` directory in Adobe Acrobat® Reader format (PDF).

Manual	Content	Document name
User Manual netLINK NL 51N-DPL	Installation, operation and hardware description of the netLINK NL 51N-DPL	netLINK NL 51N-DPL UM xx EN.pdf (this document)
Operator manual Configuration of gateway and proxy devices	Description of the configuration software SYCON.net for configuring the NL 51N-DPL: Configuration of gateway and proxy devices for netTAP, netBRICK and netLINK.	Configuration of gateway and proxy devices OI xx EN.pdf
Operator manual Ethernet Device Configuration	Assignment of the IP address for the netLINK NL 51N-DPL	Ethernet Device Configuration OI xx EN.pdf

Table 6: Documentation for the NL 51N-DPL



## 1.4 Legal Notes

### 1.4.1 Copyright

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- in life support systems;
- in systems where malfunctions of the software may result in physical damage or injury resulting in death.

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## 1.5 License

### S

The NL 51N-DPL device contains a license for the PROFIBUS-DP Master Link, which allows the communication to a DP slave.

## 2 Security

### 2.1 General information about Security

The user manual, accompanying texts and documentation have been prepared for use of the products by trained specialist personnel. When using the products, all safety instructions and applicable regulations must be observed. Technical knowledge is assumed. The user must ensure compliance with the legal requirements.

### 2.2 Intended use

The netLINK NL 51N-DPL may only be operated as part of a communication system as described in this user manual.

The device must not be opened or operated in the open state.

### 2.3 Personnel qualification

The netLINK NL 51N-DPL is used as part of a complete system, which must comply with the respective. The netLINK NL 51N-DPL is used as part of an overall system which must comply with safety and accident prevention regulations depending on the respective operating conditions. The system operator is exclusively responsible for compliance with these regulations.

It follows that the system, of which the netLINK NL 51N-DPL is a part, may only be operated and maintained by skilled personnel who are familiar with all relevant regulations.

### 2.4 Obligation to read the user manual



---

**Important:** Before installing and using your device, you must read and understand all instructions in this manual to avoid harm.

---

### 2.5 Source references Security

References Security:

[1] EN 61340-5-1 and EN 61340-5-2 as well as IEC 61340-5-1 and IEC 61340-5-2

## 2.6 Safety and warning labeling

Safety instructions and warnings are specially highlighted. The safety instructions are marked with a special safety symbol and a signal word according to the degree of danger. The hazard is precisely named in the notice.




Symbol	Type of warning or command
	Safety symbol to warn against personal injury.
	Warning of damage due to electrostatic discharge
	Commandment: Duty to read the manual

Table 7: Safety symbols and type of warning

### 2.6.1 Signal words

Signal word	Meaning
<b>DANGER</b>	indicates an immediate hazard with high risk that will result in death or serious bodily injury if not avoided.
<b>WARNING</b>	indicates a possible hazard with medium risk, which can result in death or (severe) bodily injury if not avoided.
<b>CAUTION</b>	indicates a low-risk hazard that could result in minor or moderate bodily injury or property damage if not avoided.
<b>ATTENTION</b>	Note that must be followed to avoid property damage.
<b>Note</b>	indicates an important note in the manual.

Table 8: Signal words

## 2.7 Basic Safety instructions

To avoid personal injury, it is essential that you read, understand and follow the following and all other safety instructions in this manual.

### 2.7.1 Damage due to process interruption

If data communication in a process plant is interrupted, process-dependent damage can occur, which must be clarified before the device is removed from a plant. Depending on the process, appropriate safety precautions must be taken to prevent damage to the plant and persons.



**WARNING!**

---

#### **Damage due to process interruption!**

Do not remove the device from a production plant without having ensured safe operation of the plant during or after removal of the device in order to prevent personal injury and damage to property.

---

## 2.8 Warnings about Property damage

To avoid property damage to the device and your system, you must read, understand, and follow the following and all other warnings for possible property damage in this manual.

### 2.8.1 Electrical Voltage

For operation of the device, use only 18 ... 30 V = power supply (via external Mini Combicon connection).

---

**CAUTION! Device damage**

A voltage supply of more than 30 V renders the device unusable.

---

### 2.8.2 Electrostatic Discharge

Observe the necessary precautions for electrostatically sensitive components.

**CAUTION!**

---

**Electrostatic discharge**

Make sure that the contacts of the D-Sub connector are not exposed to electrostatic discharge. This may cause damage to the device.

---

Observe the necessary precautions for electrostatically sensitive components (EN 61340-5-1 and EN 61340-5-2).

## 3 Brief description and Prerequisites

### 3.1 Brief description

The netLINK NL 51N-DPL device described in this user manual is an Ethernet gateway based on netX technology.

netLINK PROXY integrates any PROFIBUS-DP slave into a higher-level PROFINET network. Designed as a connector, it is plugged directly onto the PROFIBUS-DP interface of the DP slave and connected to the PROFINET network via the RJ45 socket.

On the PROFINET side the netLINK behaves as IO Device. The process data of the DP slave are mapped as module in the corresponding PROFINET slot/subslot according to the guideline of the PI user organization.

The device is supplied with 24 V= via the COMBICON connector.

Due to the short transmission path on the PROFIBUS, the use of a PROFIBUS bus terminating resistor is not necessary.

To configure the NL 51N-DPL, the configuration software "SYCON.net" and "Ethernet Device Setup" to be used.

The device is loaded with the required firmware at delivery. It has to be functionally adapted and configured to the respective application (coupling partner) with the configuration program "SYCON.net".



## 3.2 Requirements for the operation of the NL 51N- DPL

The following requirements must be met for operation:

1. A suitable 24 V power supply must be available.

**Attention!**

---

### Device damage

- **The reference potential of the power supply is galvanically connected to the reference potential of the PROFIBUS.**
  - The voltage supply must not exceed 30 V DC, otherwise device damage is possible.
- 

2. The configuration of the device must be done. For this purpose, the SYCON.net system configurator is supplied.

## 3.3 K onfiguration requirements

To configure the netLINK 51N-DPL, the configuration software "SYCON.net" and "Ethernet Device Setup" must be installed on a PC.

### The PC must meet the following requirements for this:

- PC with 1 GHz processor or higher
- Windows® 2000, Windows® XP, Windows® Vista (32-bit), Windows® 7 (32-bit) or Windows® 7 (64-bit)
- Internet Explorer 5.5 or higher
- Free hard disk space: approx. 400 MByte
- DVD-ROM drive
- RAM: min. 512 MByte, recommended 1024 MByte
- Resolution: at least 1024 x 768 pixels
- Keyboard and mouse



---

**Note:** If a project file is saved and opened again or used on another PC, the system requirements must match. In particular, it is necessary that the DTMs are also installed on the PC used.

---



---

The installation of the SYCON.net software is described in the document *Software Installation - Gateway Solution UM xx EN.pdf*.

---

# 4 Device drawings and Connections

## 4.1 Mate drawings

Dimensions in mm.

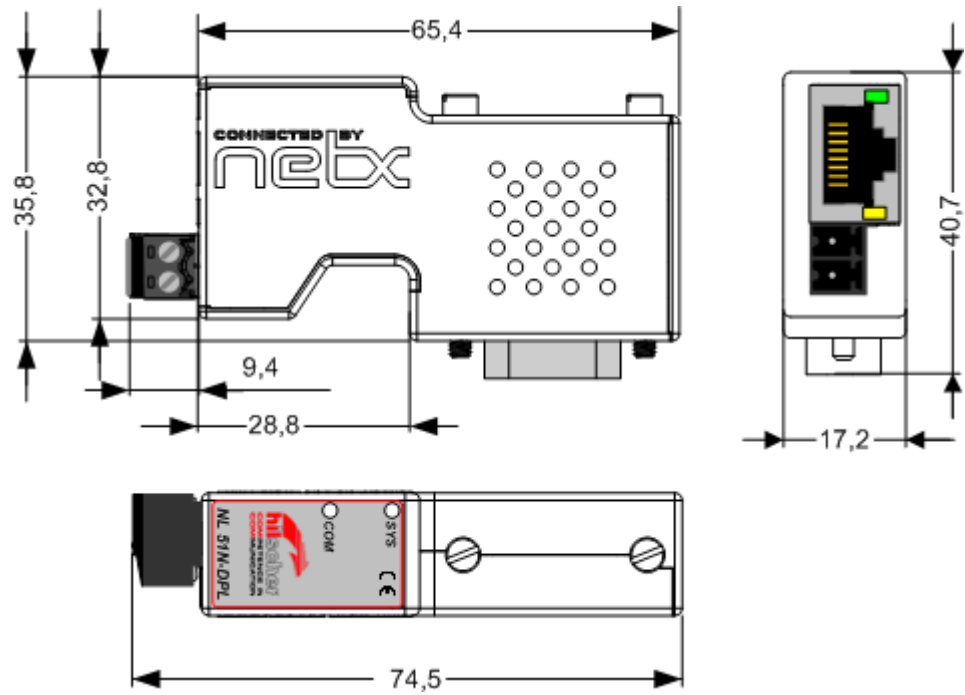


Figure 1: Dimensioned drawing

## 4.2 Labels

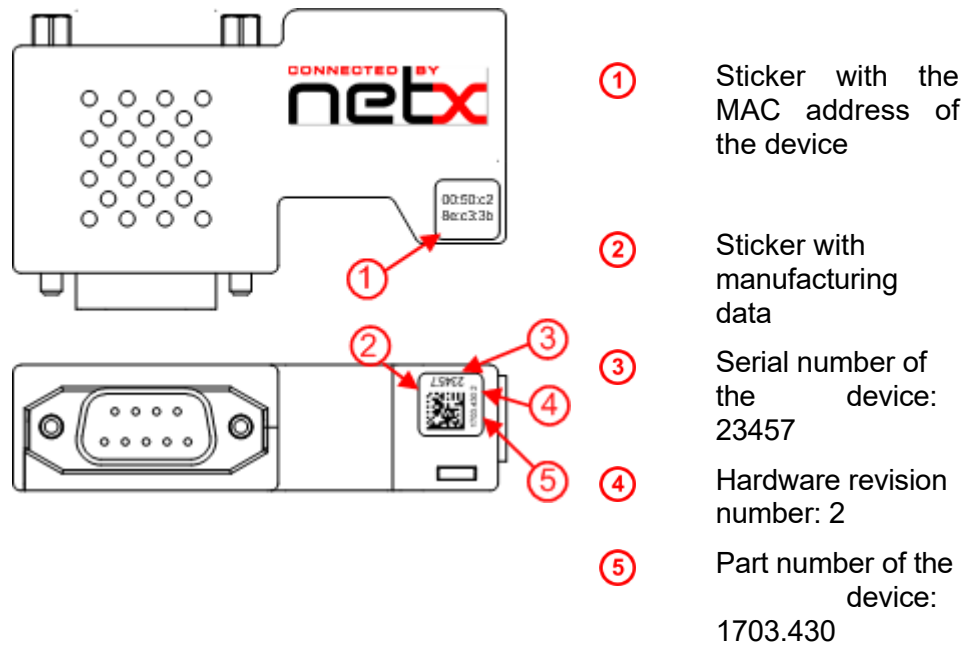


Figure 2: Labels

### 4.3 Connections



Figure 3: Connections of the device

#### 4.3.1 X1 Power supply

**Power supply Pin assignment**


Voltage supply	Pin	Signal	Description
 —1 —2 Mini Combicon	1	0 V / GND	GND of the power supply, 1 nF / 2000V against shield / housing.
	2	24 V	+24 V power supply

Table 9: Power supply pin assignment

The plug for this connection is included in the scope of delivery of the device.

### 4.3.2 X2 Ethernet port

#### Ethernet to RJ45 pin assignment

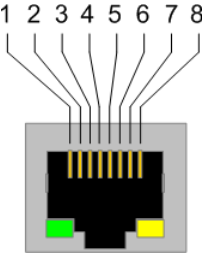
Ethernet	Pin	Signal	Meaning
 <p>RJ45 jack</p>	1	TX+	Send data +
	2	TX-	Send data -
	3	RX+	Receive data +
	4		Connected to PE via an RC element.*
	5		Connected to PE via an RC element.*
	6	RX-	Receive data -
	7		Connected to PE via an RC element.*
	8		Connected to PE via an RC element.*
		PE	Metal housing on PE
			* Bob Smith Graduation

Table 10: RJ45 Ethernet pin assignment

The netLINK Proxy NL 51N-DPL operates the Ethernet interface in Auto-Crossover mode. Therefore Ethernet crossover cables as well as patch cables can be used to connect Ethernet devices.

### 4.3.3 X3 PROFIBUS

**CAUTION! Device damage**

- The reference potential of the power supply is galvanically connected to the reference potential of the PROFIBUS.
- If the power supply is not tapped from the DP slave but supplied externally, the external power supply must be potential-free.

**RS-485 PROFIBUS pin assignment**

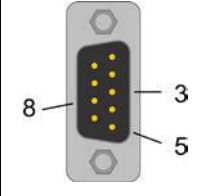
PROFIBUS	Pin	Signal	Meaning
 <p>DSub socket, 9-pin</p>	3	Rx/Tx +	Receive/transmit data positive.
	5	GND	Reference potential, 1 nF / 2000V against PE
	8	Rx/Tx -	Receive/transmit data negative.
	Umbrella a	PE	Metal protection collar.

Table 11: PROFIBUS RS-485 pin assignment

## 4.4 Schematic diagram Galvanic isolation

The following diagram shows the galvanic isolation ranges.



**Important:** The PE connection of the device is made via the shield connections of the PROFIBUS-DP connector and the shield connection of the PROFINET IO connector via the metal housing of the Ethernet socket. The metallized outside of the housing is at PE potential.

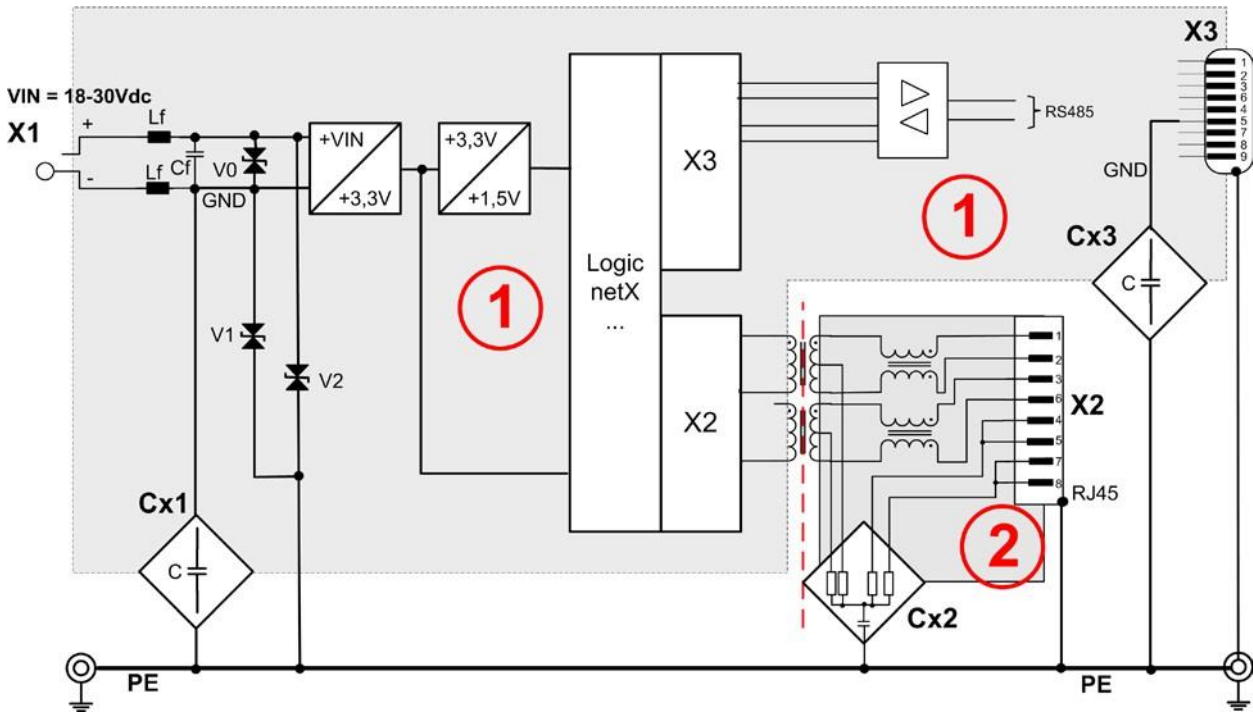


Figure 4: Galvanic separations

Area Connection	Protocol	Galv. separation	Coupling	Coupling against PE	Shield connection to PE
① X1	-	no	Cx1 ① V0, V1, V2	22 pF / 63 V $U_{BR} = 33 \dots 37 \text{ V}$	-
② X2	PROFINET IO	inductive	Cx2 ②	4 * 75 Ω, 1 nF / 2000 V	directly via the metal housing of the RJ 45 jack
① X3	PROFIBUS DP	no	Cx3 ①	1 nF / 2000 V	directly via the metal housing of the D-Sub connector

Table 12: Galvanic separations NL 51N-DPL

## 5 Commissioning

### 5.1 Warnings about Property damage

Observe the following warnings against property damage when installing the netLINK NL 51N-DPL.

#### 5.1.1 Electrostatic sensitive components

Observe the necessary precautions for electrostatically sensitive components.



#### Electrostatic sensitive components

Make sure that the contacts of the D-Sub connector are not exposed to electrostatic discharge. This may cause damage to the device.

### 5.2 Mounting

The netLINK NL 51N-DPL is plugged and screwed with the PROFIBUS interface directly to a PROFIBUS slave device.

Via the metal collar of the D-Sub connector the housing of the netLINK NL 51N-DPL is connected to the shield of the PROFIBUS Slave device. Thus, the metal housing of the RJ45 jack is connected to this potential at the same time.

### 5.3 Ethernet connection

Commissioning and PROFINET operation is performed via Ethernet port X2. The Ethernet connection to the configuration PC can be established directly via an Ethernet patch cable or indirectly via the company or plant network. If configuration is to be performed during runtime and with the PROFINET controller and network already installed, the use of a PROFINET switch is mandatory.

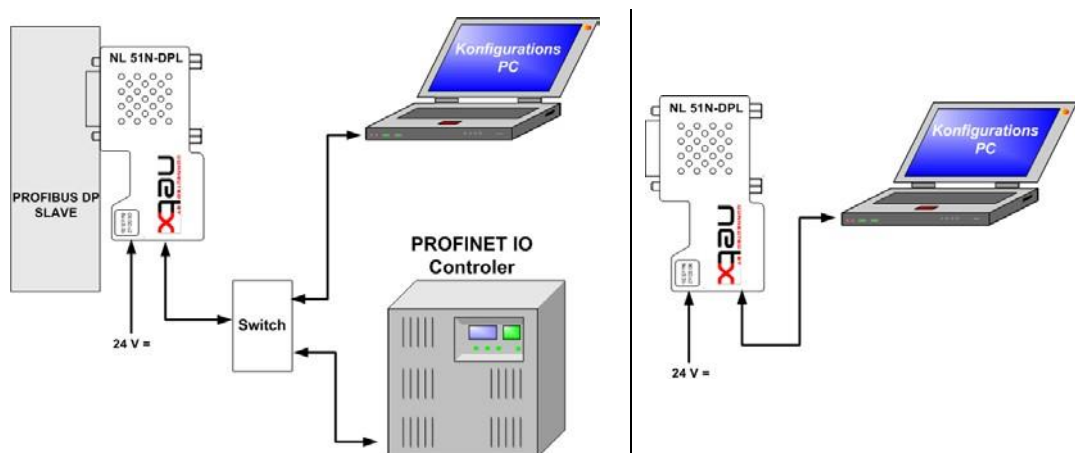


Figure 5: Possible configuration interconnections



## 5.4 Configuration

In the delivery state, the device has the IP address 0.0.0.0. For communication, it must receive a valid IP address. The PROFINET controller assigns the IP address automatically during the startup phase. For configuration via the configuration PC, the IP address must be configured manually.

### 5.4.1 Set IP address

The IP address assignment is done with the software "Ethernet Device Setup". It is installed together with the SYCON.net configurator. A network scan with the software finds Hilscher devices network-wide via Ethernet broadcasting, independent of their IP address. Even devices with the IP address 0.0.0.0 are found.



The procedure for this is described in the user manual *Ethernet Device Configuration on OI xx EN.pdf*, which you may find on the product DVD in the directory `Documentation\deutsch\1.Software\Ethernet Device Setup Tool`.

---



**Note:** Make sure that the set IP address is free and belongs to the corresponding subnet in which the configuration PC is located. As a rule, the later PROFINET IP address and the configuration IP address differ from each other.

---



**Note:** If the IP address is assigned with the Ethernet device setup program via the "Netident" protocol option, the IP address is not permanently stored in the device. A power loss or later configuration download resets the IP address back to 0.0.0.0. If a new configuration is necessary, the address must therefore be set again as described above.

---

The assignment of the IP address allows access via the configuration program SYCON.net and its TCP/IP driver.

### 5.4.2 Connection setup SYCON.net - netLINK 51N- DPL



How to establish the communication between SYCON.net and the NL 51N-DPL is described in the user manual *Configuration of Gateway and Proxy Devices OI xx EN.pdf* in section Settings. You can find this manual on the product DVD in the directory `Documentation\deutsch\1.Software\SYCON.net configuration software`.

---

### 5.4.3 Import GSD file

The commissioning requires the import of the GSD file of the connected PROFIBUS slave and the announcement in the device catalog. For this purpose use the menu Network > **Import device descriptions** and then select the file type **PROFIBUS GSD**.



**Note:** Ask the manufacturer of the PROFIBUS device for this file if it was not included with the device.

### 5.4.4 PROFIBUS network- Scan

In delivery state the NL 51N-DPL is already preloaded with a PROFIBUS configuration of 1.5 MBaud. With SYCON.net a PROFIBUS network scan can be performed immediately. The scan identifies the connected PROFIBUS slave and prepares the configuration of the NL 51N-DPL. The scan is only completed if the GSD file of the slave has been imported before.



The procedure for the network scan is described in the user manual *PROFIBUS DP Master DTM OI xx EN.pdf* in section *Network Scan*, which you find on the product DVD in the directory Documentation\deutsch\1.Software\SYCON.net Configuration Software\Master Configuration\PROFIBUS DP Master.

Of course, the PROFIBUS slave can also be configured manually. The procedure for this can be found in the same operator manual.



**Note:** The PROFIBUS slave chips commonly used today automatically adjust to the baud rate and are reliably found with the baud rate 1.5 Mbaud. If the connected PROFIBUS slave does not support this baud rate, the corresponding baud rate must be set in the PROFIBUS master parameters in SYCON.net and transferred to the NL 51N-DPL via download.

### 5.4.5 Configuration- Download

After creating the configuration of the PROFIBUS master, the overall configuration is transferred to the NL 51N-DPL via download command. The device immediately starts the communication to the PROFIBUS slave. The LED COM shows the state green. With the download the device will reset itself to the IP address 0.0.0.0. It is ready to receive its PROFINET IP address from the controller.



The download procedure is described in the operator manual *Configuration of gateway and proxy devices OI xx EN.pdf*. You can find this manual on the product DVD in the directory Documentation\deutsch\1.Software\SYCON.net configuration software.

## 5.4.6 Export GSDML file

For the operation of the NL 51N-DPL at PROFINET controllers a GSDML file is required. Due to the dynamic PROFIBUS configuration and the associated effects on the GSDML file, this file can be created with SYCON.net. Export the GSDML file and use it to configure your PROFINET controller.



---

The procedure for exporting the GSDML file is described in the user manual *Configuration of gateway and proxy devices OI xx EN.pdf*, which can be found on the product DVD in the directory Documentation\deutsch\1.Software\SYCON.net configuration software.

---

## 5.4.7 Configure station name/multiple netLINK NL 51N- DPL

In delivery state the NL 51N-DPL has the PROFINET station name "nl51ndpl". If several NL 51N-DPL devices with the same configuration are operated on a PROFINET network, the devices must be given different logical PROFINET station names so that they can be clearly identified by the PROFINET controller.

The station name can be set in the "PROFINET Device" parameter dialog in the configuration software SYCON.net. A subsequent configuration download changes the station name in the device and an export of the GSDML file provides the controller with the new name.

When using several identical PROFIBUS slaves and therefore the same configuration of the NL 51N-DPL, it is not practical to generate several GSDML files. Therefore PROFINET provides to change station names or IP addresses of PROFINET devices via Ethernet by DCP protocol, if they are identical devices.

The NL 51N-DPL PROFINET station name or also the IP address can be changed permanently with the "Ethernet Device Setup" tool via the DCP protocol. This is also possible if the device is already configured by SYCON.net.



---

The procedure for this is described in detail in the *Device Configuration OI xx EN.pdf* user manual, which can be found on the product DVD in the Documentation\deutsch\1.Software\Ethernet Device Setup Tool directory.

---

## 5.5 Start-up behavior

After configuration download or power recovery it takes approx. 2 s until the device is ready for operation. If configured, the communication to the PROFIBUS slave is always started automatically and cannot be interrupted.

In the delivery state, the device reports via Ethernet with the IP address 0.0.0.0. If the device has been configured with a static IP address or has been commissioned once by a PROFINET controller, the IP address may deviate from this.

If an inconsistency in the configuration data is detected after the download, the device sets itself to the IP address 0.0.0.0 (as in delivery state). In this state it can be identified with the "Ethernet Device Setup" tool, assigned an IP address and then configured again with the SYCON.net configuration program.

## 5.6 Decommissioning

If data communication in a process plant is interrupted, process-dependent damage can occur, which must be clarified before the device is removed from a plant. Depending on the process, appropriate safety precautions must be taken to prevent damage to the system and persons.



**WARNING!**

---

**Warning: To** prevent personal injury and property damage, do not remove the instrument from a production facility without ensuring safe operation of the facility during or after removal of the instrument.

---

The device itself does not require any special measures during decommissioning.

## 6 Troubleshooting

There are two levels of error analysis.

- The analysis about the states of the LEDs on the device. see section LEDs page 30.
- The analysis via the Ethernet interface of the device with a PC with the software SYCON.net.

This error analysis is only possible if the PC with the SYCON.net software can be looped into the communication path of the PROFINET IO bus system via a switch.



For more information about online diagnostics in SYCON.net, refer to the *Configuration of Gateway and Proxy Devices 01 xx EN.pdf* file in the documentation directory of the product DVD.

---

## 7 LEDs

The following table describes the meaning of the system status LED.





LED	Color	State	Meaning
<b>SYS</b> Number in the graphic <b>1</b>	<b>Duo LED yellow/green</b>		
	 (green)	A	Firmware started.
	 (yellow)	A	This condition may only occur for a short time. If the LED remains permanently yellow, there may be a hardware defect.
	 (yellow/green)	Flashing yellow/green	Bootloader is active. The device is loaded with firmware from the flash memory. If this state remains permanently, the device must be sent to Hilscher GmbH for repair.
	 (off)	From	Missing operating voltage or there is a hardware defect.

Table 13: System LED

The following table describes the meaning of the LEDs of the PROFIBUS DP master protocol.






LED	Color	State	Meaning
<b>COM</b> <b>2</b>	<b>Duo LED red/green</b>		
	 (green)	Acyclic flashing	No configuration or stack error
	 (green)	Cyclic flashing	Profibus is configured, but bus communication is not yet released by the application.
	 (green)	A	Communication established with the slave
	 (red)	Cyclic flashing	Communication to at least one slave interrupted
	 (red)	A	Communication to all/one slave interrupted

Table 14: LEDs PROFIBUS DP master

The following table describes the meaning of the LEDs for the device.




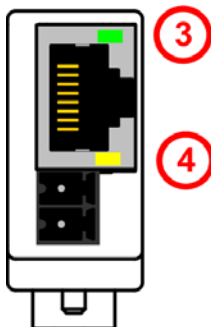
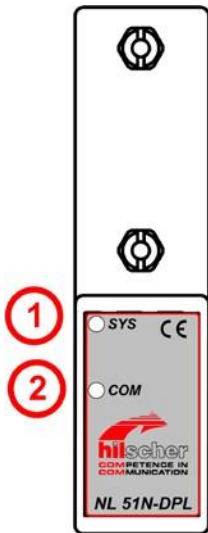
LED	Color	State	Meaning
<b>LINK RJ45</b> <b>3</b>	<b>LED green</b>		
	 (green)	A	There is a connection to the Ethernet
	 (off)	From	The device has no connection to the Ethernet
<b>RX/TX RJ45</b> <b>4</b>	<b>LED yellow</b>		
	 (yellow)	Flashes	The device sends/receives Ethernet frames

Table 15: LEDs Ethernet



## 8 Technical Data

### 8.1 netLINK NL 51N- DPL

NL 51N-DPL	Parameter	Value
Communication controller	Type	netX 50
Memory	RAM	8 MB SDRAM
	FLASH	4 MB serial flash, with bootloader, firmware and configuration
PROFIBUS DP interface	Transmission rate	9.6 kBit/s to 12 MBit/s
	Interface type	RS-485 (tied to operating voltage potential)
	Connector	DSub connector 9 pin
	Automatic baud rate detection	Not supported
Ethernet communication	Data transport	TCP/IP
	Connections	max. 16 TCP connections at the same time
	PROFINET IO Controller Connections	1
Ethernet interface	Transmission rate	10/100 MBit/s
	Interface type	10 BASE-T/100 BASE-TX, potential-free
	Connector	RJ45 jack
	Auto-negation	supports
	Car crossover	supports
Display	LED display	SYS System Status COM Communication Status ACT Ethernet Activity Status LNK Ethernet Link Status
Power supply	Operating voltage	18 ... 30 V DC (typ. 24 V DC) Supply voltage cable length < 30 meters.
	Current consumption at 18 V	typ. 80 mA
	Current consumption at 24 V	typ. 70 mA
	Current consumption at 30 V	typ. 53 mA
	Connection for external supply	Mini combicon jack 3.81 mm 2-pole
Interference emission		CISPR 11 Class A
Interference immunity		EN 61131-2: 2003
Environment	Temperature range	0 ... + 50 °C
	Humidity range	0 ... 85 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	74.5 x 40.7 x 17.2 mm (L incl. power supply connector)
	Weight	approx. 35 g
	Assembly / Installation	to PROFIBUS socket
	Protection class	IP 20
	CE Mark	Yes
Configuration	Software	SYCON.net
	Software	Ethernet devices setup

Table 16: Technical data NL 51N-DPL

## 8.2 Protocols

### 8.2.1 PROFINET IO Device

Parameter	Description
Maximum number of cyclic input da- dents	244 bytes (maximum number of a PROFIBUS-DP slave)
Maximum number of cyclic output data	244 bytes (maximum number of a PROFIBUS-DP slave)
Supported protocols	RTC - Real Time Cyclic Protocol, Class 1 and 2 (unsynchronized) RTA - Real Time Acyclic Protocol DCP - Discovery and configuration Protocol CL-RPC - Connectionless Remote Procedure Call LLDP - Link Layer Discovery Protocol SNMP - Simple Network Management Protocol
Protocols used (subset)	UDP, IP, ARP, ICMP (Ping)
Topology detection	LLDP, SNMP V1, MIB2, physical device
VLAN and priority tagging	Yes
Context Management by CL-RPC	Supports
Minimum cycle time	1ms
Baud rate	100 MBit/s
Data Transport Layer	Ethernet II, IEEE 802.3
Restrictions	RT over UDP' is not supported Multicast communication is not supported DHCP is not supported IRT is not supported: neither RT class 2 synchronized ('flex') nor RT class 3 ('top') Fast Startup is not supported. Media redundancy (MRT, MRRT) is not supported The amount of configured input/output data influences the achievable minimum cycle time The supervisor AR is not supported Only one input CR and one output CR each are supported
Reference to firmware/stack version	V3.4.x.x

Table 17: Technical data PROFINET IO RT IRT Device Protocol



## 8.2.2 PROFIBUS-DP Master

Parameter	Description
Maximum number of PROFIBUS-DP slaves	1 (only to a slave)
Maximum number of cyclic input data	244 bytes
Maximum number of cyclic output data	244 bytes
Configuration data	Max. 244 bytes
Parameterization data	7 bytes default parameters Max. 237 bytes application-specific parameters
Acyclic communication	DPV1 class 1: read/write, alarm
Baud rate	9.6 kBits/s, 19.2 kBits/s, 31.25 kBits/s, 45.45 kBits/s, 93.75 kBits/s, 187.5 kBits/s, 500 kBits/s, 1, 5 MBits/s, 3 MBits/s, 6 MBits/s, 12 MBit/s  Automatic baud rate detection is not supported
Data Transport Layer	PROFIBUS FDL
Restrictions	DP V1 class 2 services not supported DP V2 services are not implemented
Reference to firmware/stack version	2.4.x.x

Table 18: Technical data PROFIBUS-DP master link protocol

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# netLINK PROXY

Commissioning on S7-1200

# Explanation of symbols



Single click left Single click



right Double click left



Observe



Keyboard input



... ● ..

. Action items to be processed



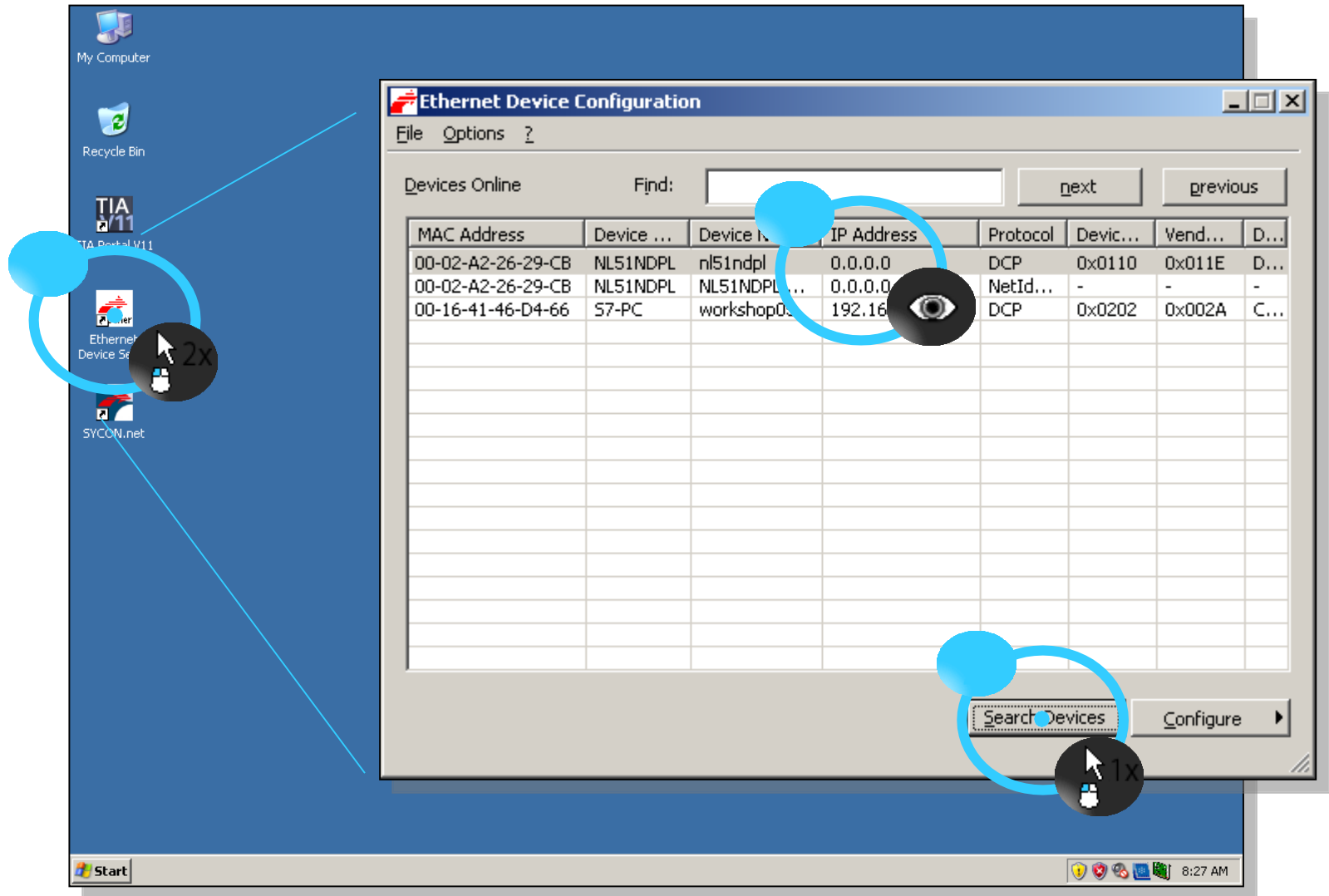
## LAN devices scanner

Identify connector and assign temporary IP address

# Connect plug with workshop PC



# Search device in LAN network



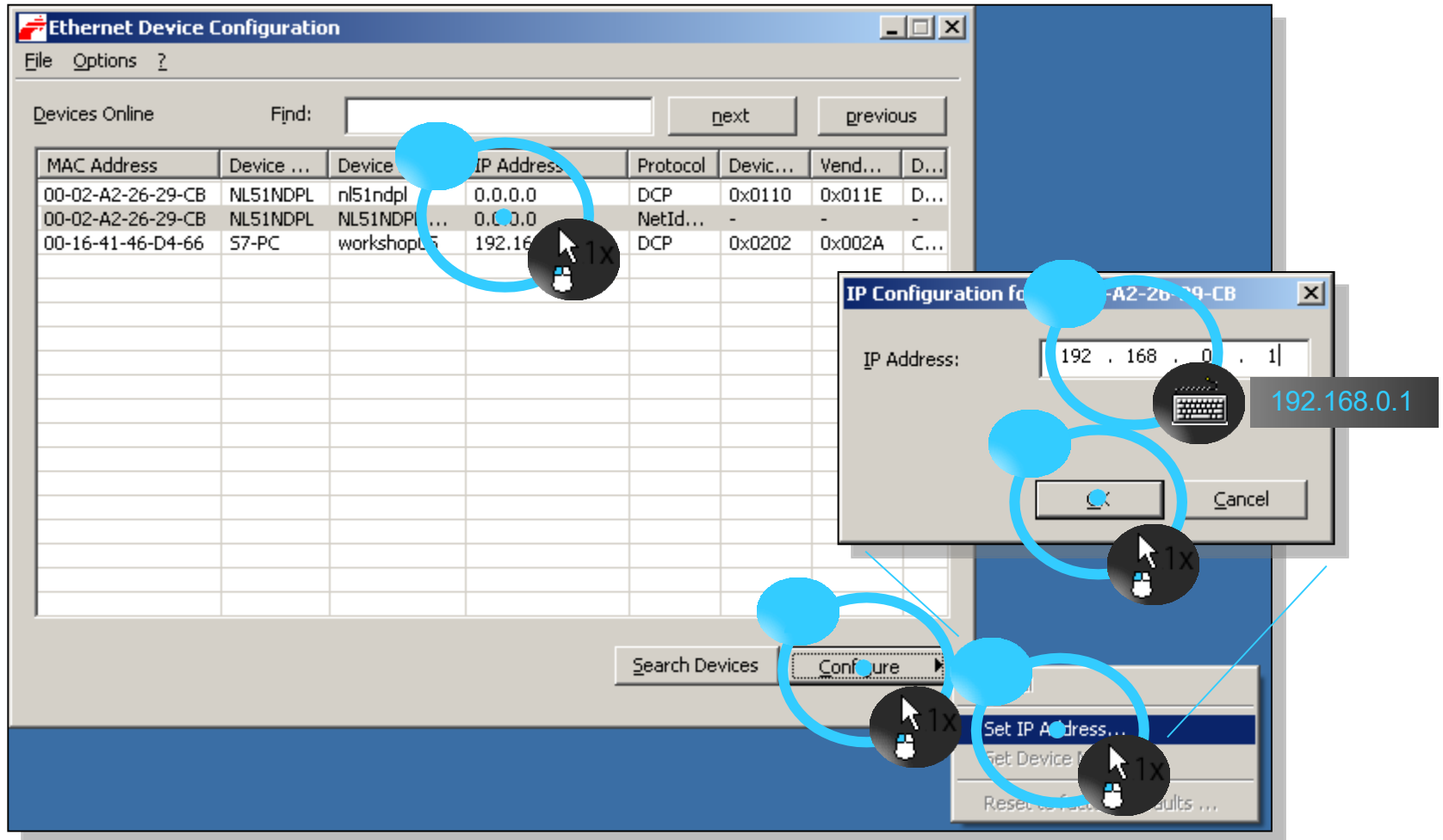
The screenshot shows the 'Ethernet Device Configuration' window. The 'Devices Online' section contains a table with the following data:

MAC Address	Device ...	Device N...	IP Address	Protocol	Devic...	Vend...	D...
00-02-A2-26-29-CB	NL51NDPL	nL51ndpl	0.0.0.0	DCP	0x0110	0x011E	D...
00-02-A2-26-29-CB	NL51NDPL	NL51NDPL ...	0.0.0.0	NetId...	-	-	-
00-16-41-46-D4-66	S7-PC	workshop0...	192.16...	DCP	0x0202	0x002A	C...

Annotations include a magnifying glass over the 'Search Devices' button (1x) and another magnifying glass over the 'Find' input field and the first row of the table (2x). A blue circle highlights the 'Find' input field, and another blue circle highlights the 'Search Devices' button.



# Assign temporary IP address



The screenshot shows the 'Ethernet Device Configuration' software interface. A table lists online devices with their MAC addresses, device names, and current IP addresses. A dialog box titled 'IP Configuration for [Device Name]' is open, showing the IP address field set to '192.168.0.1'. A tooltip displays '192.168.0.1'. The 'Configure' button is highlighted in the main window, and a context menu is visible over it with 'Set IP Address...' selected. Blue circles and arrows indicate the sequence of actions: selecting a device in the table, opening the IP configuration dialog, entering the IP address, and clicking the 'Configure' button.

MAC Address	Device ...	Device	IP Address	Protocol	Devic...	Vend...	D...
00-02-A2-26-29-CB	NL51NDPL	nl51ndpl	0.0.0.0	DCP	0x0110	0x011E	D...
00-02-A2-26-29-CB	NL51NDPL	NL51NDPL ...	0.0.0.0	NetId...	-	-	-
00-16-41-46-D4-66	S7-PC	workshop5	192.168.0.1	DCP	0x0202	0x002A	C...

IP Configuration for [Device Name]

IP Address: 192.168.0.1

192.168.0.1

Search Devices    Configure

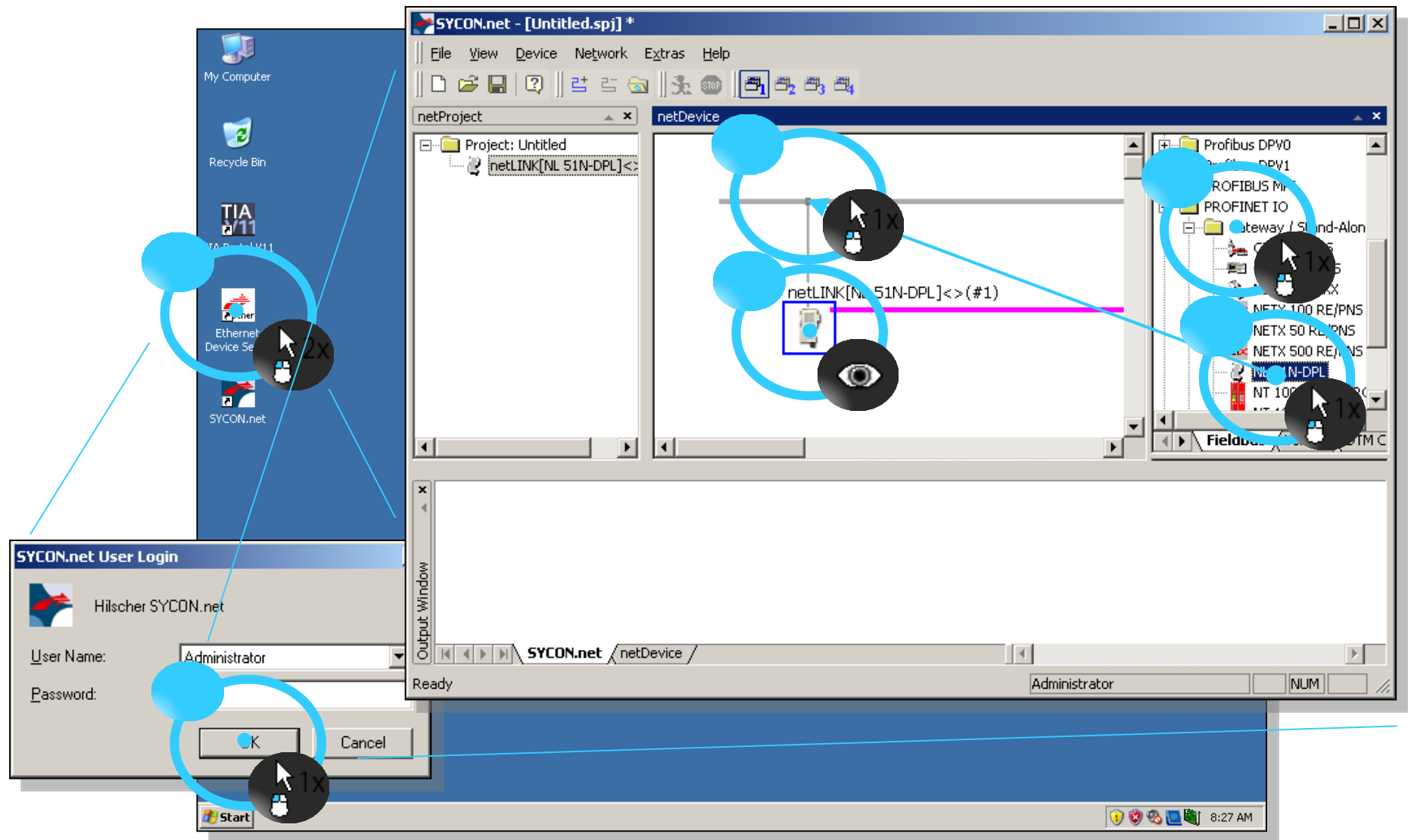
Set IP Address...  
Get Device IP...  
Reset Device IP... Results ...



## Configuration tool SYCON.net

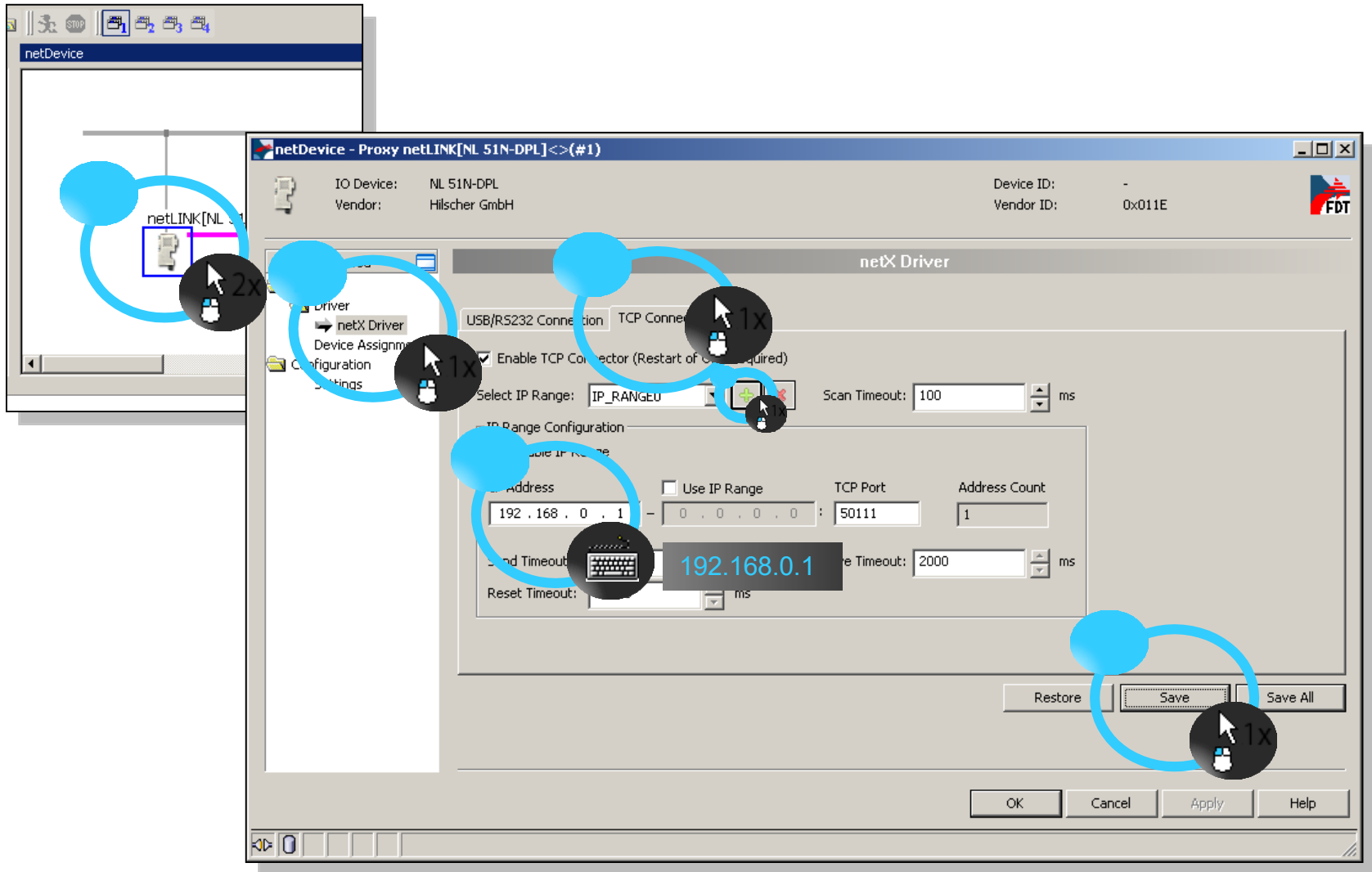
Configure connector and generate GSDML file

# Select device from the device catalog

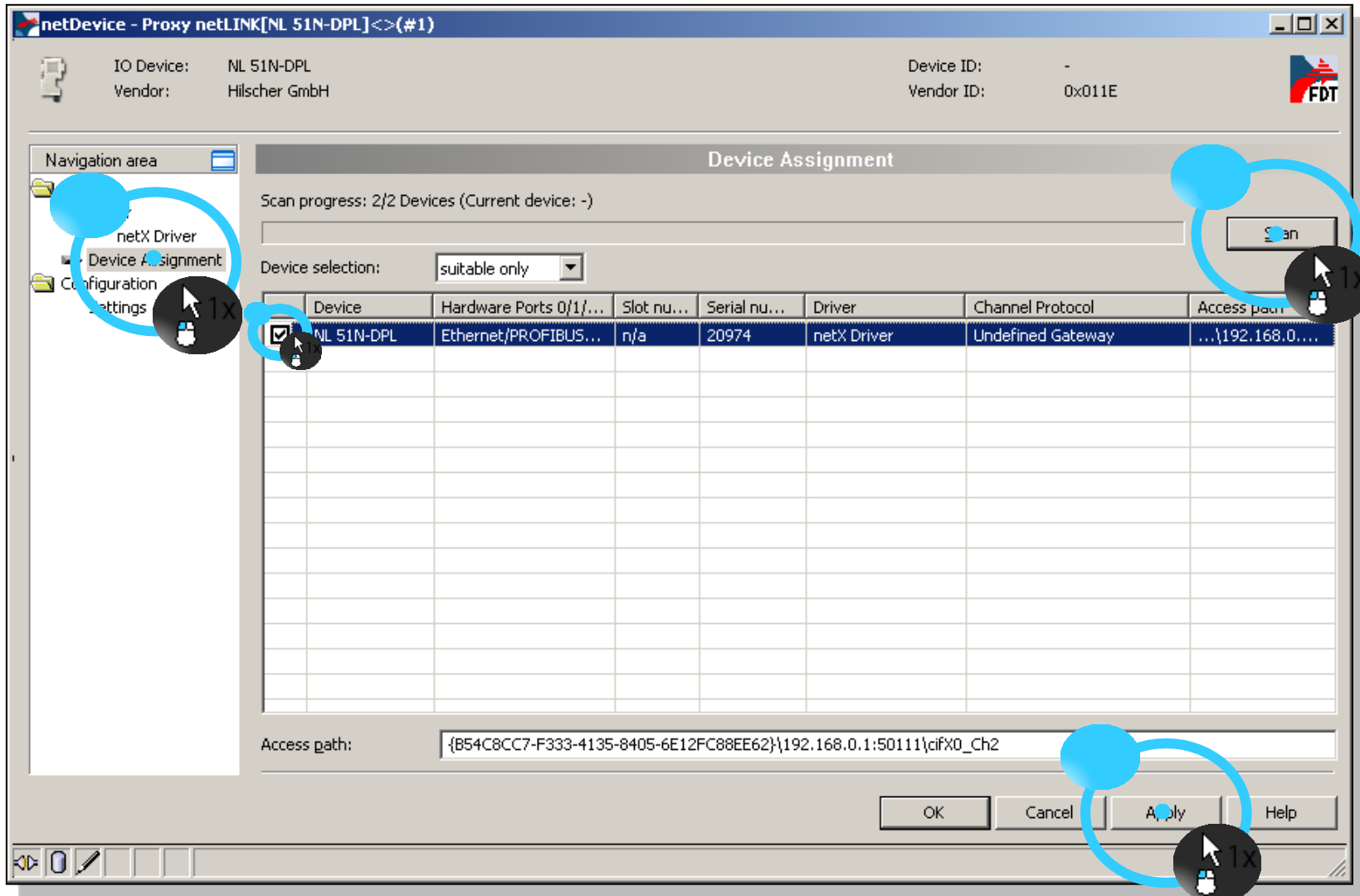


The screenshot displays the SYCON.net software interface. The main window shows a network diagram with a device labeled 'netLINK[NL 51N-DPL]<>(#1)'. A device catalog on the right lists various communication modules, including 'Profibus DPV0', 'PROFIBUS DPV1', 'PROFINET IO', and 'NETX 500 RE/PNS'. A 'SYCON.net User Login' dialog box is open in the foreground, showing the user name 'Administrator' and the 'OK' button. Blue circles and lines highlight the 'Ethernet Device Selection' icon on the desktop, the 'netLINK[NL 51N-DPL]<>(#1)' device in the network diagram, and the 'NETX 500 RE/PNS' device in the catalog.

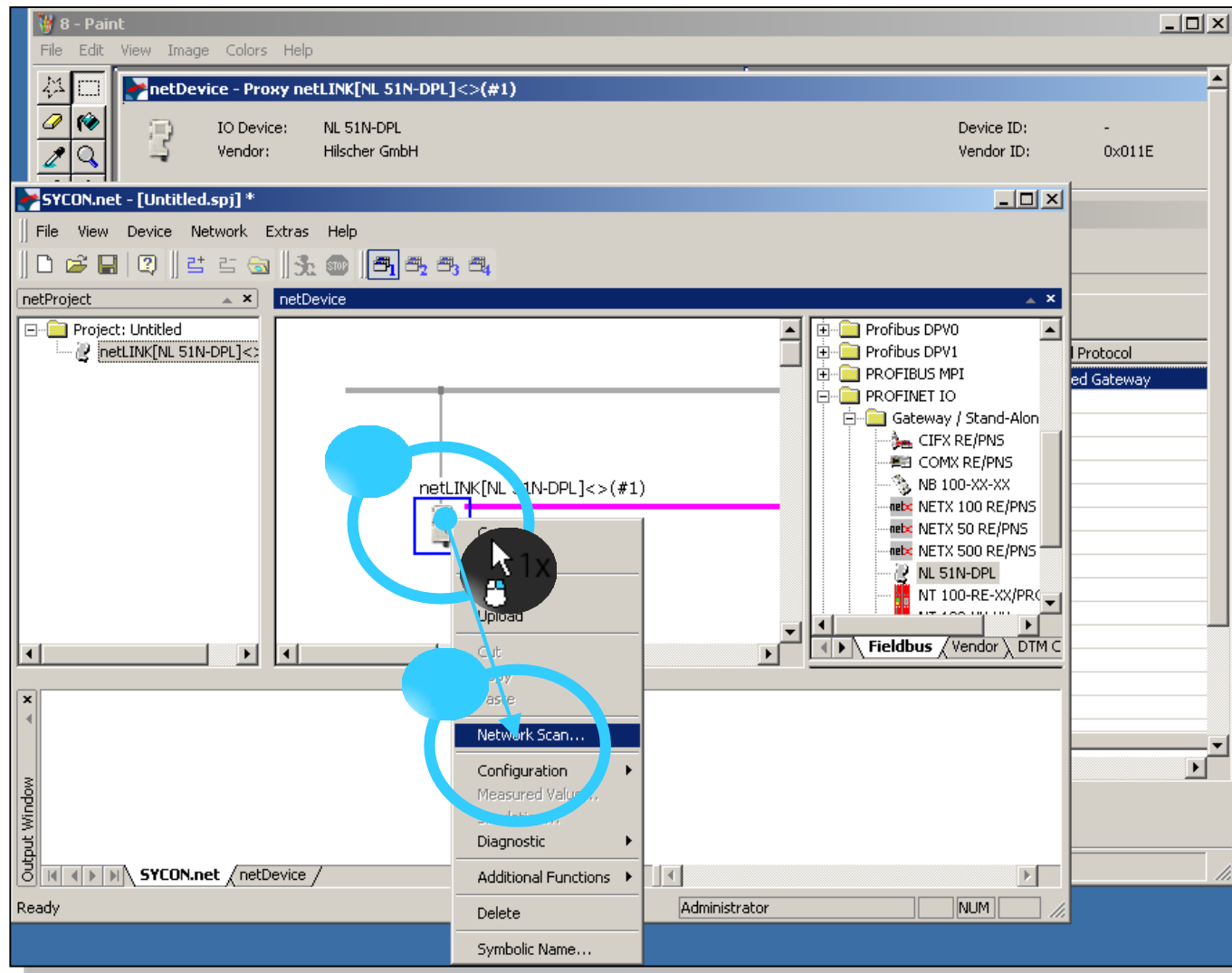
# Configure device connection



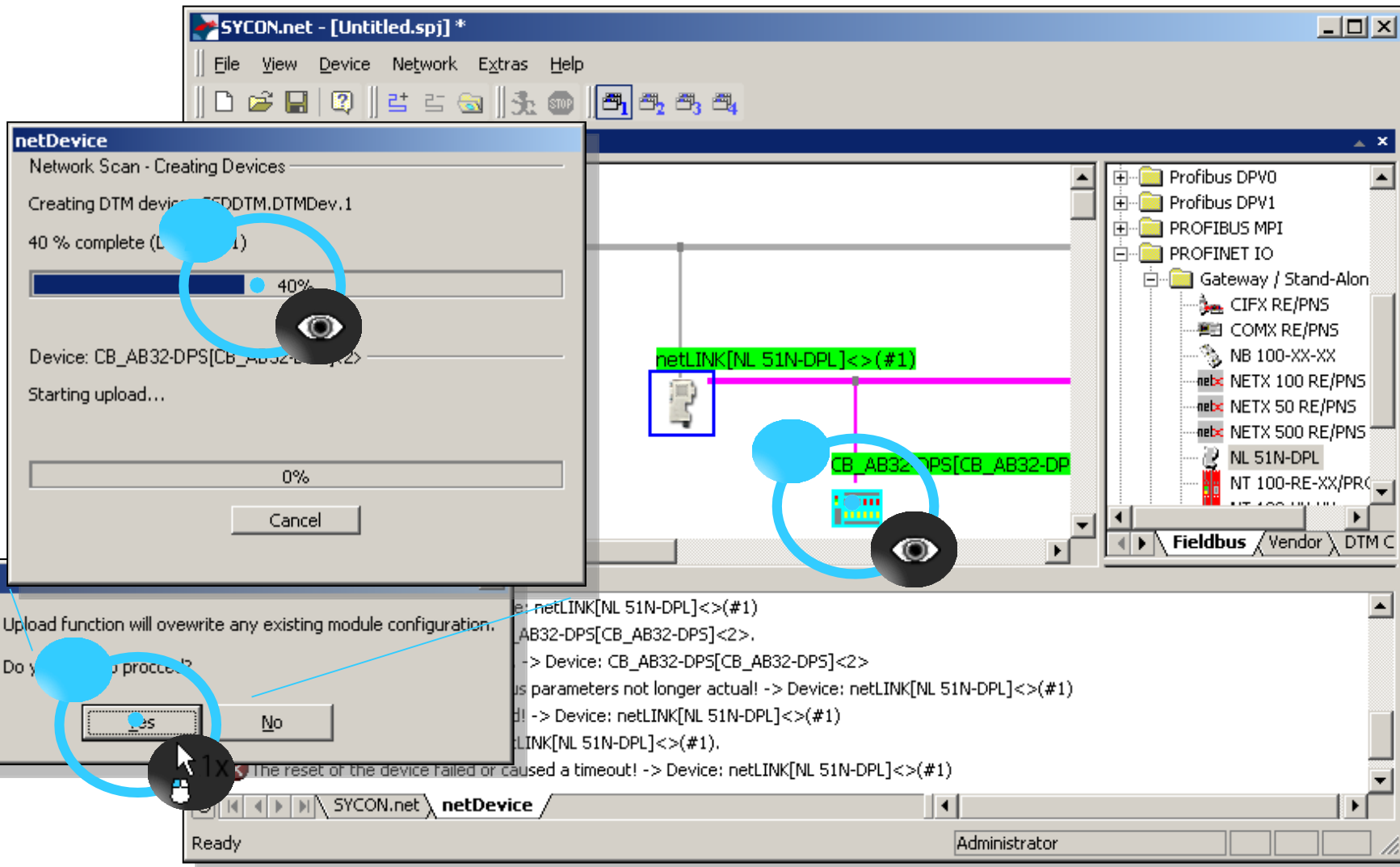
# Fix device connection



# Scan PROFIBUS automatically



# Wait for PROFIBUS configuration



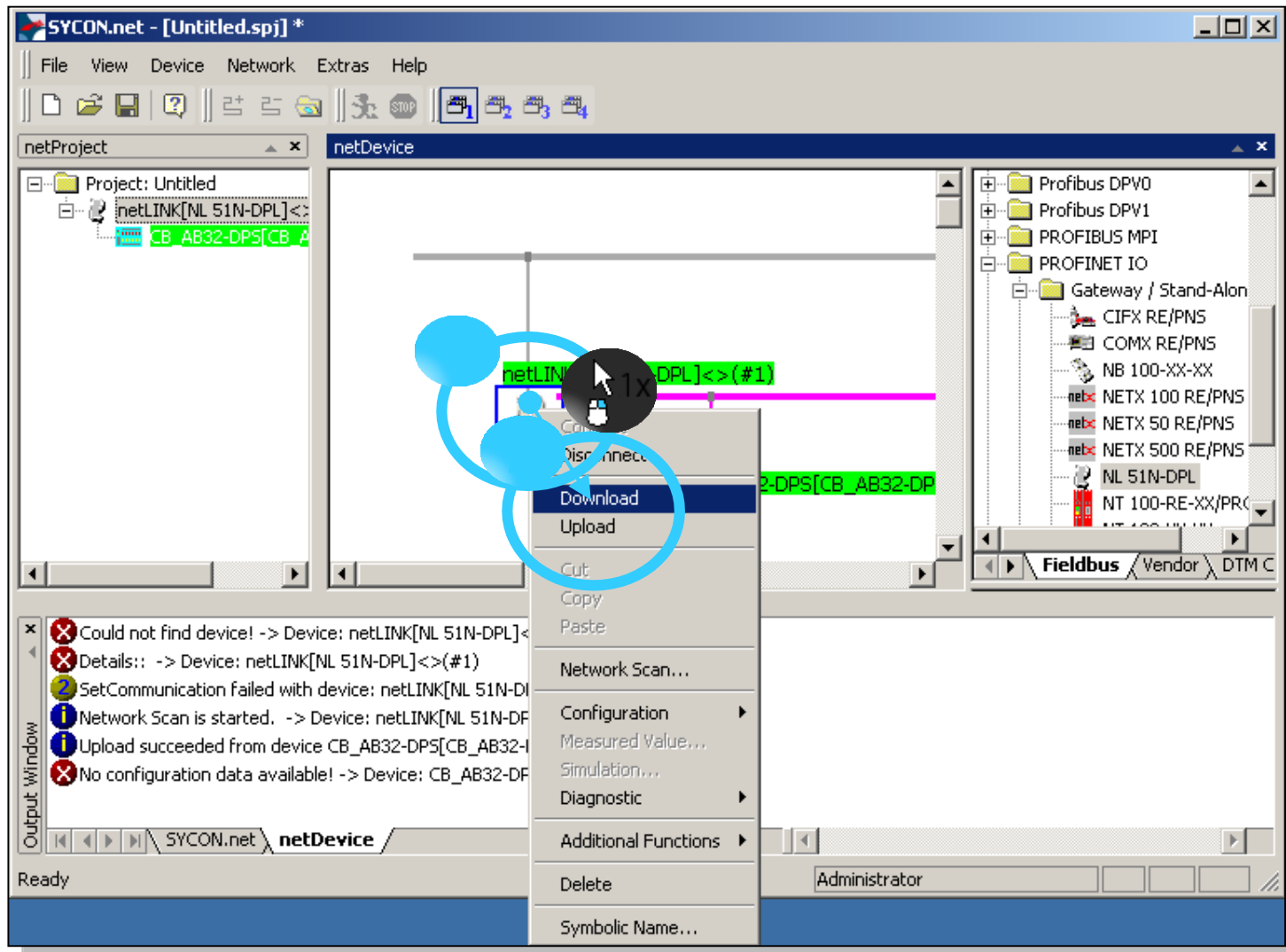
The screenshot shows the SYCON.net software interface. The main window displays a network diagram with a bus and several devices. A dialog box titled "netDevice" is open, showing the progress of creating and uploading a device. The progress bar is at 40%. A "Question" dialog box is also open, asking for confirmation to proceed with the upload. The background network diagram shows a bus with a device labeled "netLINK[NL 51N-DPL]<>(#1)" and another device labeled "CB\_AB32-DPS[CB\_AB32-DP".

**netDevice**  
Network Scan - Creating Devices  
Creating DTM device: CDDTM.DTMDev.1  
40 % complete (L...)  
Device: CB\_AB32-DPS[CB\_AB32-DP<2>  
Starting upload...  
0%  
Cancel

**Question**  
Upload function will overwrite any existing module configuration.  
Do you want to proceed?  
Yes No

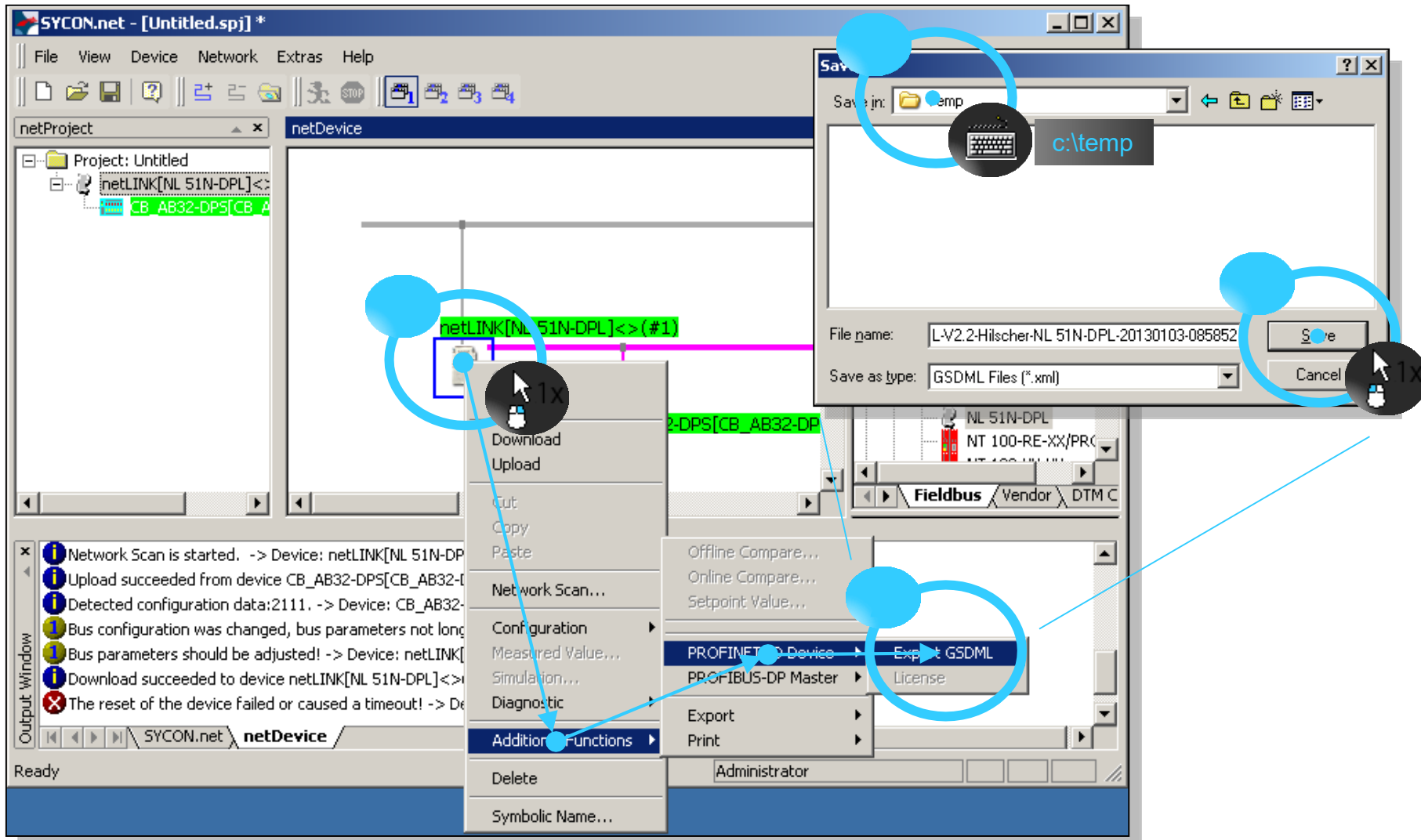
netLINK[NL 51N-DPL]<>(#1)  
AB32-DPS[CB\_AB32-DPS]<2>.  
-> Device: CB\_AB32-DPS[CB\_AB32-DPS]<2>  
Parameters not longer actual! -> Device: netLINK[NL 51N-DPL]<>(#1)  
-> Device: netLINK[NL 51N-DPL]<>(#1)  
LINK[NL 51N-DPL]<>(#1).  
LINK[NL 51N-DPL]<>(#1)  
-> Device: netLINK[NL 51N-DPL]<>(#1)

# Load configuration into the device





# Export GSDML file



The screenshot illustrates the process of exporting a GSDML file from the SYCON.net software. The main window shows a network diagram with a device 'netLINK[NL 51N-DPL]<> (#1)' selected. A context menu is open over this device, and the 'Additional Functions' option is selected, leading to a sub-menu where 'Export GSDML' is highlighted. A 'Save' dialog box is open in the foreground, showing the file name 'L-V2.2-Hilscher-NL 51N-DPL-20130103-085852' and 'Save as type: GSDML Files (\*.xml)'. The 'Save' button is highlighted. Blue circles and arrows indicate the sequence of actions: clicking the device, navigating the menu, and clicking the 'Save' button.



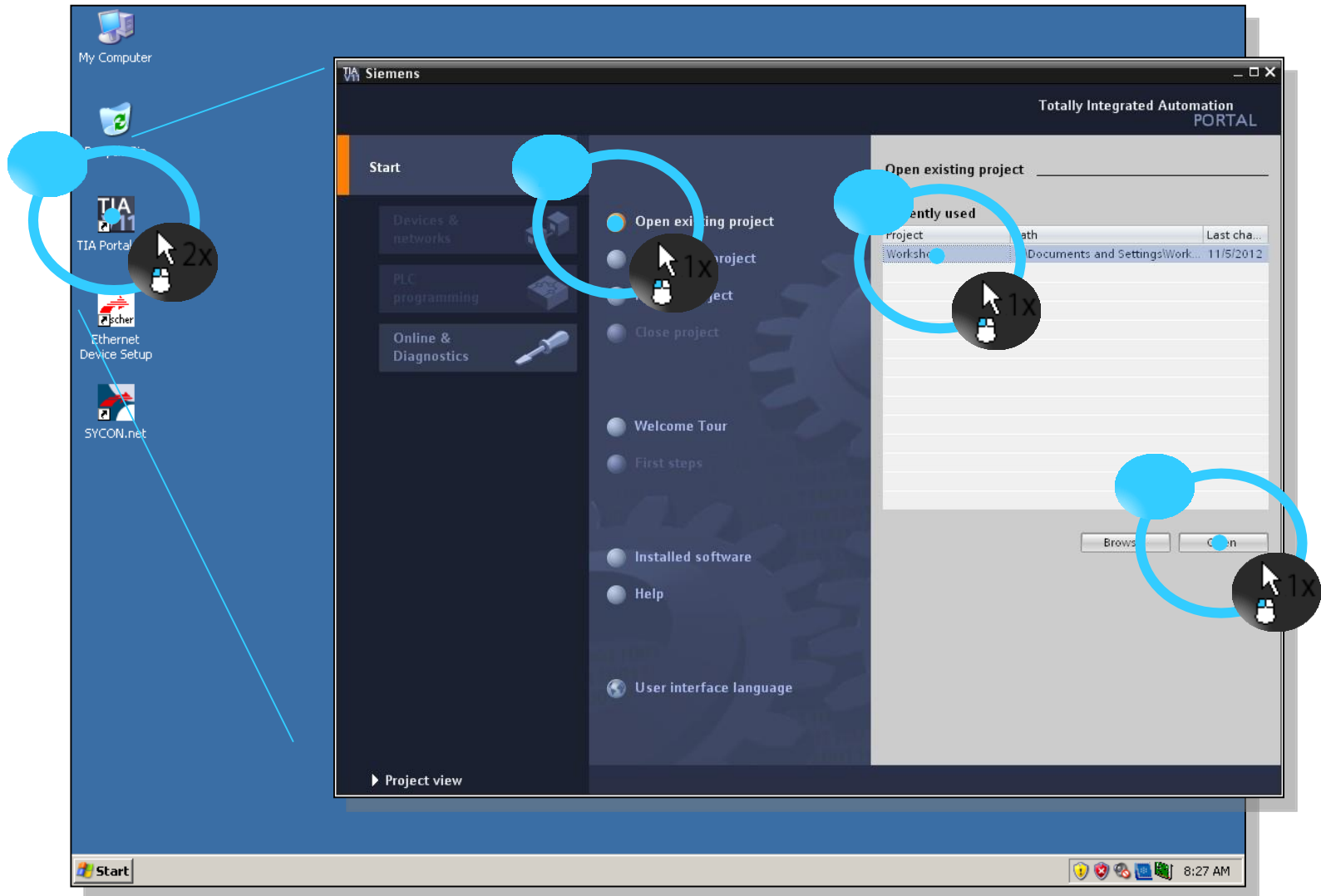
# Siemens PLC programming tool TIA Portal

GSDML file import, PROFINET configuration, PLC program

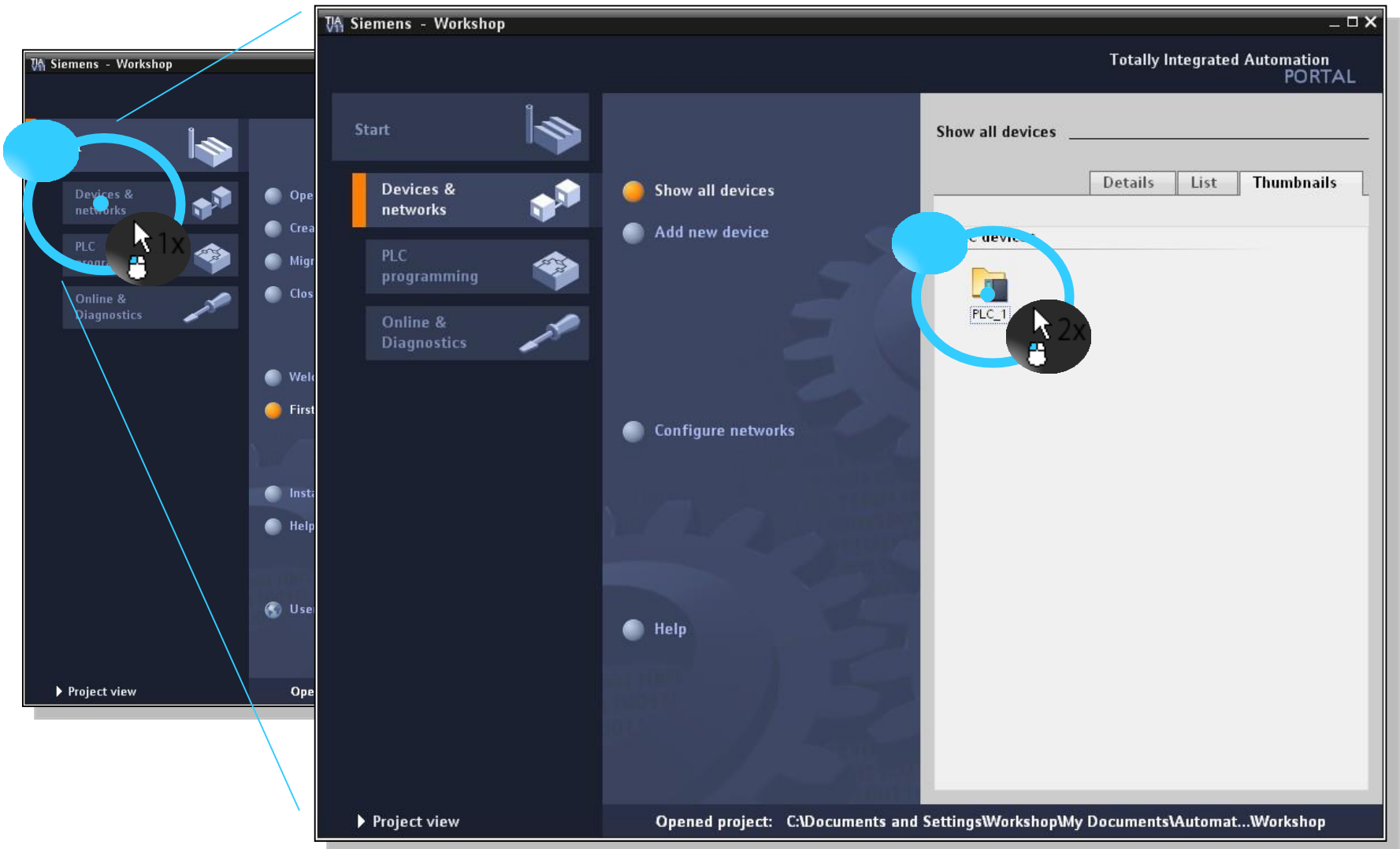
# Connect PLC with Wokshop PC



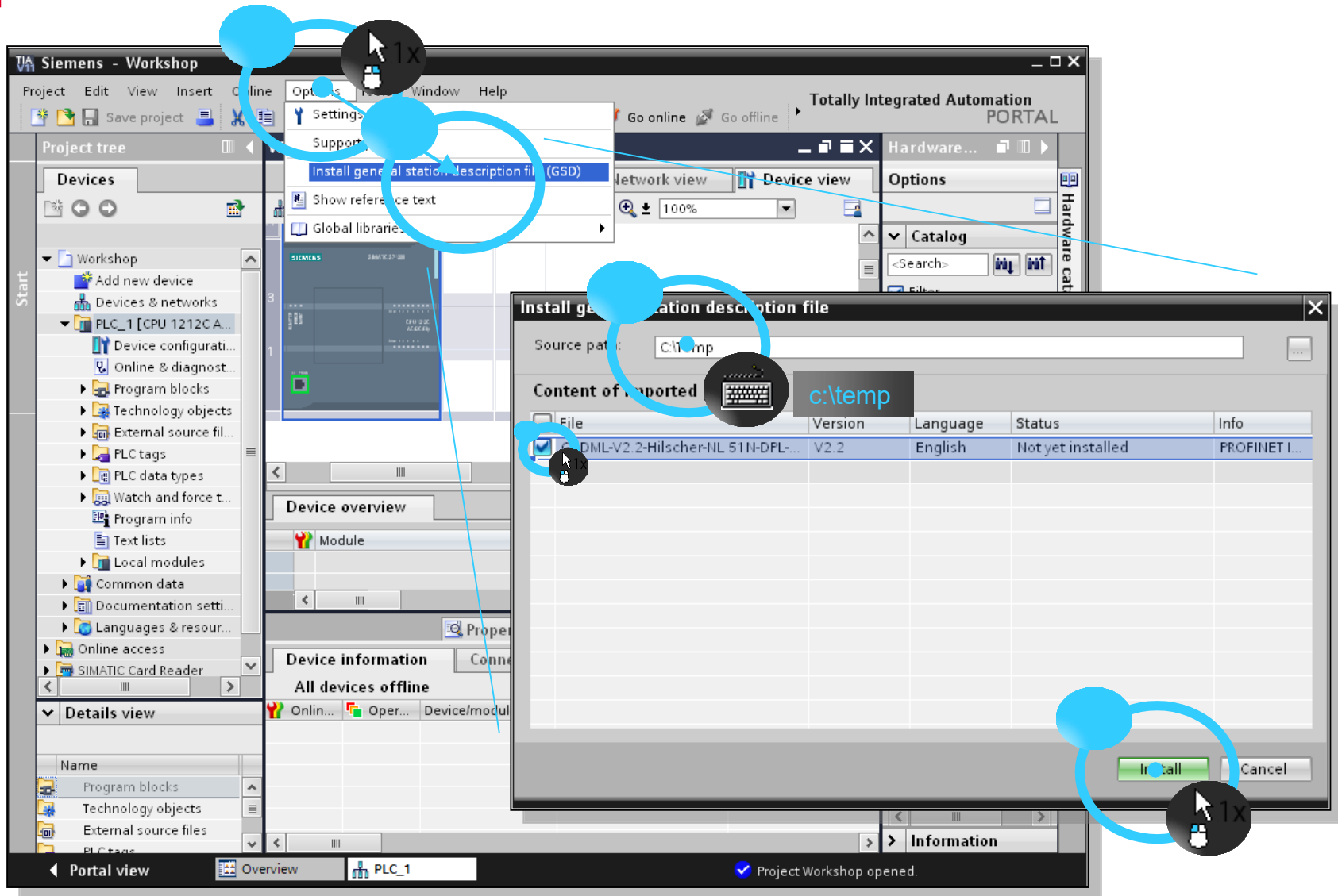
# Open existing project



# Start network configuration



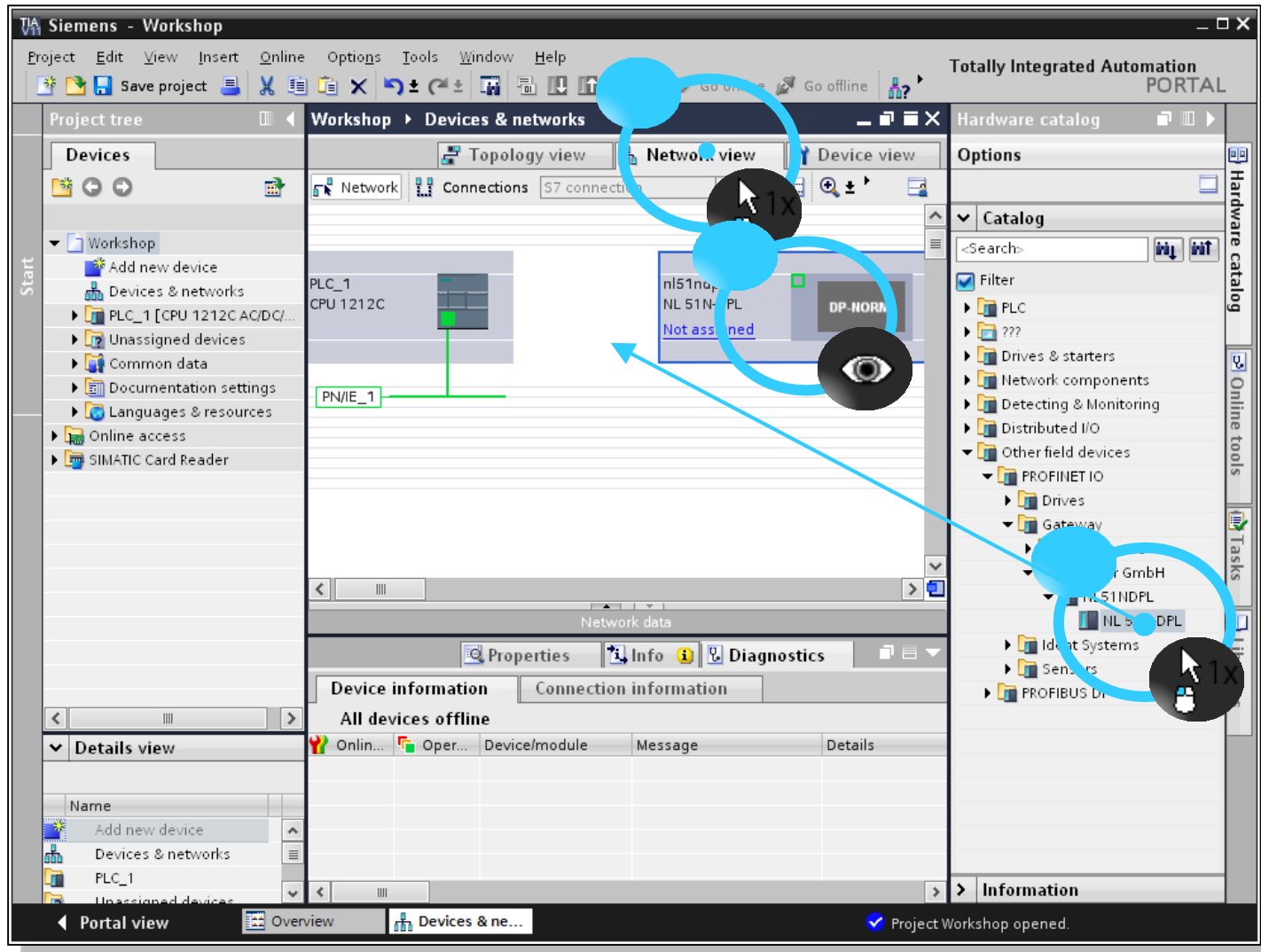
# Import GSDML file



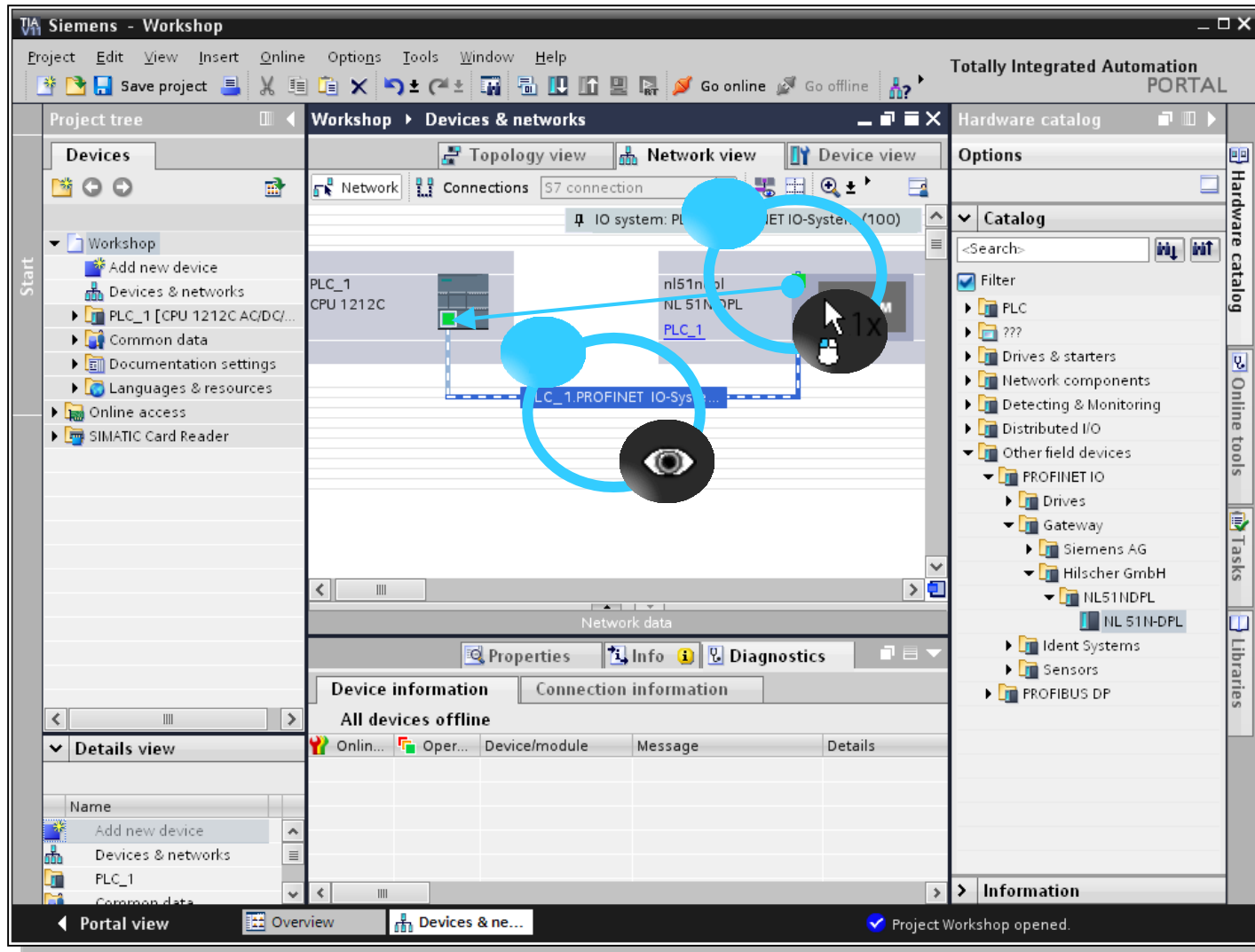
The screenshot shows the Siemens Workshop interface with the 'Install general station description file (GSD)' dialog box open. The dialog box is titled 'Install general station description file' and has a 'Source path' field set to 'c:\temp'. The 'Content of imported' tab is active, displaying a table of imported GSD files. The table has columns for 'File', 'Version', 'Language', 'Status', and 'Info'. The file 'GSDML-V2.2-Hilscher-NL 51N-DPL...' is selected, with a version of 'V2.2', language of 'English', and status of 'Not yet installed'. The 'Install' button is highlighted in green.

File	Version	Language	Status	Info
<input checked="" type="checkbox"/> GSDML-V2.2-Hilscher-NL 51N-DPL...	V2.2	English	Not yet installed	PROFINET I...

# Pulling a device from the device catalog



# Logical PROFINET connection

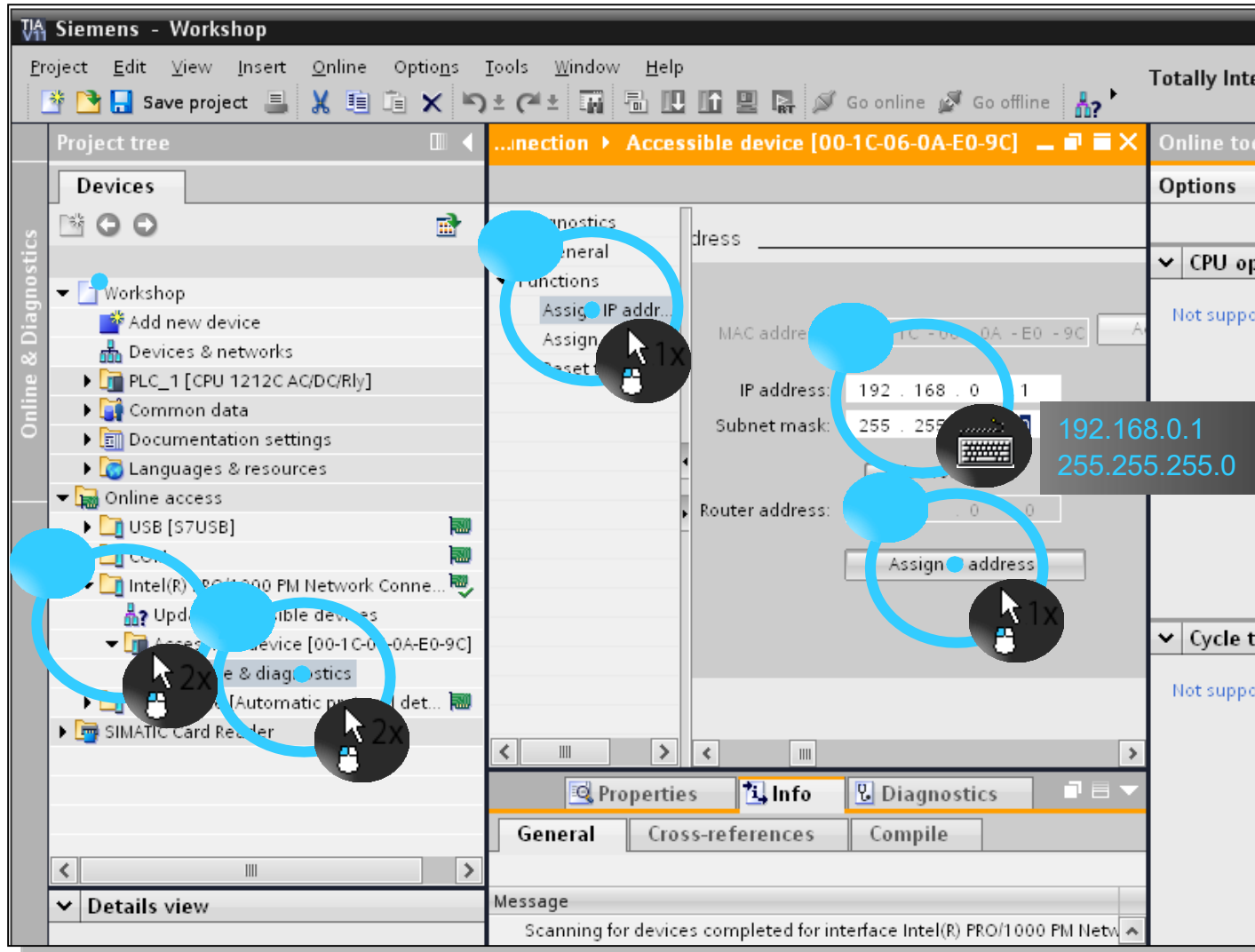


The screenshot displays the Siemens SIMATIC Manager interface, specifically the 'Workshop' environment. The main window shows a network diagram in 'Network view' with two PLCs connected via a PROFINET IO system. The left PLC is labeled 'PLC\_1 CPU 1212C' and the right one is 'n151ndpl NL 511NDPL PLC\_1'. A blue dashed line represents the 'LC\_1.PROFINET IO-System' connection between them. The interface includes a 'Project tree' on the left, a 'Hardware catalog' on the right, and a 'Properties' window at the bottom. The 'Properties' window shows 'Device information' and 'Connection information' tabs, with a table indicating 'All devices offline'. The status bar at the bottom indicates 'Project Workshop opened'.

Onlin...	Oper...	Device/module	Message	Details



# Set IP address of the fresh PLC

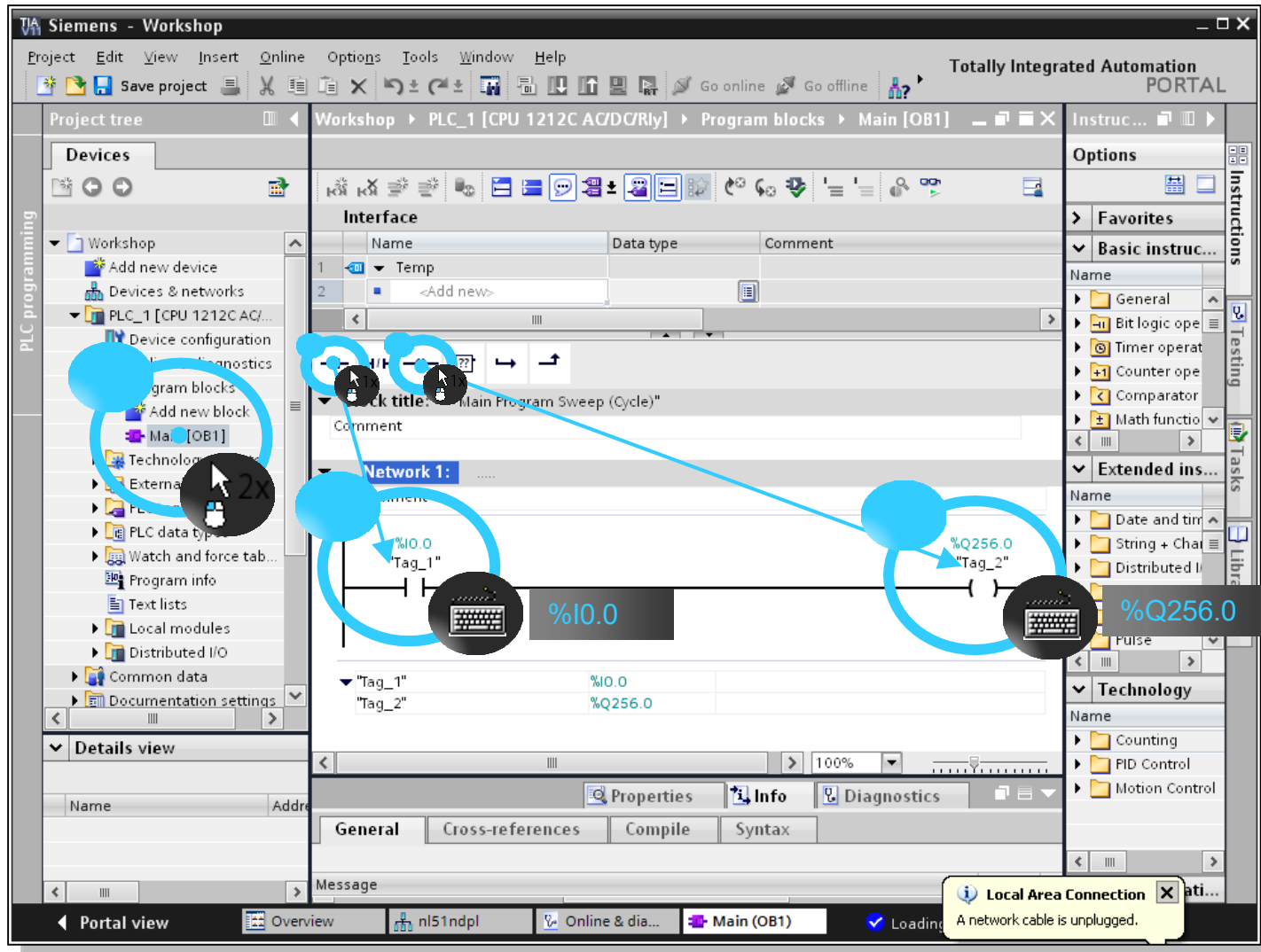


The screenshot shows the Siemens TIA Workshop interface. The main window is titled "Accessible device [00-1C-06-0A-E0-9C]". The left sidebar shows the "Project tree" with "Devices" expanded, listing "Workshop", "Add new device", "Devices & networks", "PLC\_1 [CPU 1212C AC/DC/Rly]", "Common data", "Documentation settings", "Languages & resources", "Online access", "USB [S7USB]", "Intel(R) PRO/1000 PM Network Connection", "Update available devices", "Accessible device [00-1C-06-0A-E0-9C]", "Diagnostics & diagnostics", "Automatic project detection", and "SIMATIC Card Reader".

The main window displays the "Properties" view for the selected device. The "General" tab is active, showing the "IP address" field set to "192.168.0.1" and the "Subnet mask" field set to "255.255.255.0". A callout box highlights these values. The "Assign IP address" button is visible. The "Router address" field is also visible, set to "0.0.0.0".

The bottom status bar shows a message: "Scanning for devices completed for interface Intel(R) PRO/1000 PM Network Connection".

# Write small PLC test program

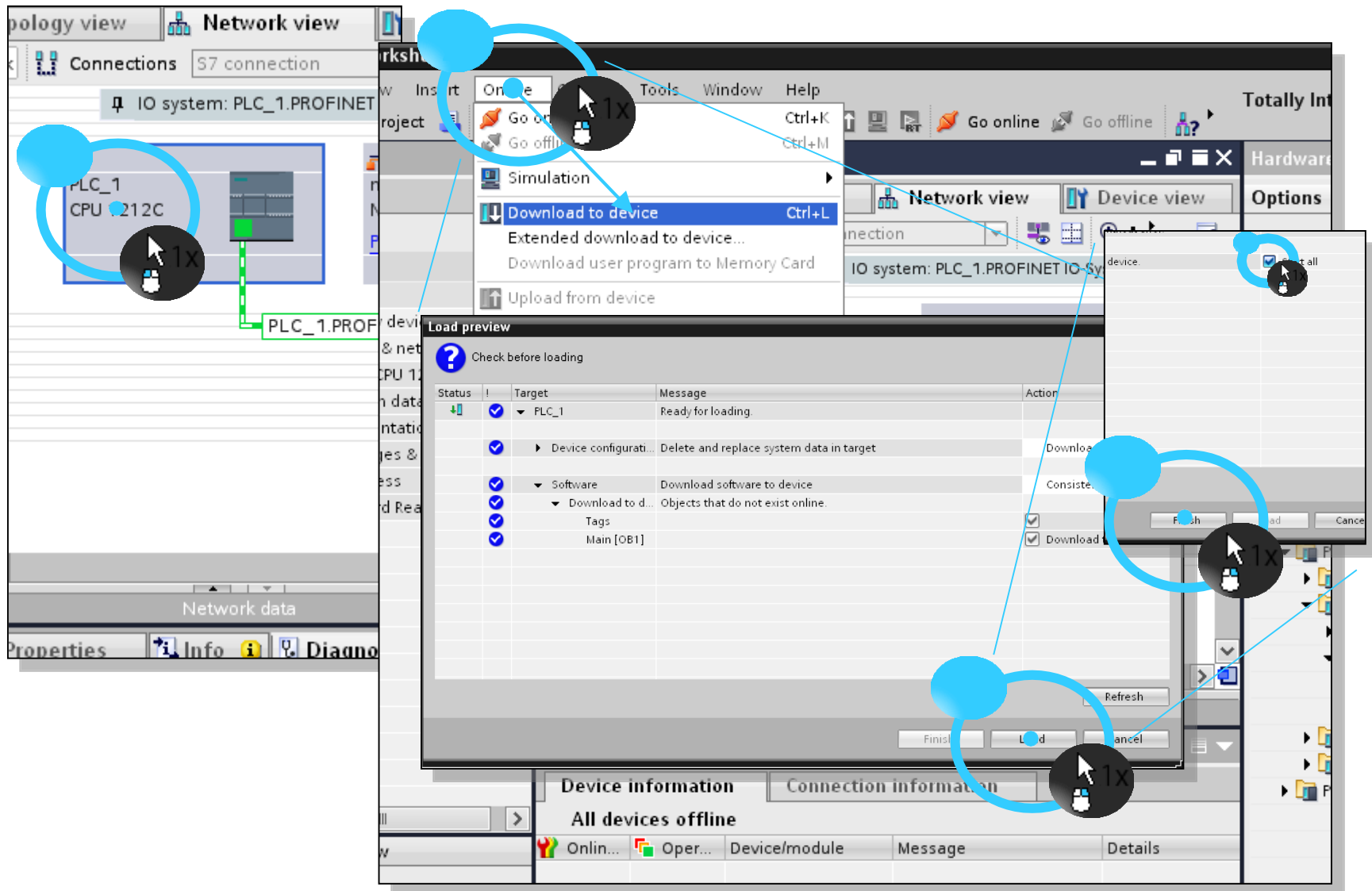


The screenshot displays the Siemens SIMATIC Manager interface for a PLC test program. The main window shows a ladder logic network with two normally open contacts labeled "%I0.0" and "%Q256.0". The "%I0.0" contact is connected to a coil labeled "Tag\_1", and the "%Q256.0" contact is connected to a coil labeled "Tag\_2". The interface includes a Project tree on the left, a central workspace for the program, and a right-hand pane with various toolbars and options. A status bar at the bottom indicates a "Local Area Connection" warning: "A network cable is unplugged."

Name	Data type	Comment
1	Temp	
2	<Add new>	

Name	Data type
"Tag_1"	%I0.0
"Tag_2"	%Q256.0

# Load configuration into PLC



The screenshot illustrates the process of loading configuration into a PLC. The main window shows the 'Network view' with a connection to 'IO system: PLC\_1.PROFINET'. The 'Download to device' menu is open, showing options like 'Download to device' (Ctrl+L), 'Extended download to device...', 'Download user program to Memory Card', and 'Upload from device'. The 'Load preview' dialog is open, displaying a table of items to be loaded:

Status	Target	Message	Action
<input checked="" type="checkbox"/>	PLC_1	Ready for loading.	
<input checked="" type="checkbox"/>	Device configurati...	Delete and replace system data in target	Download
<input checked="" type="checkbox"/>	Software	Download software to device	Consiste...
<input checked="" type="checkbox"/>	Download to d...	Objects that do not exist online.	
<input checked="" type="checkbox"/>	Tags		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Main [OB1]		<input checked="" type="checkbox"/>

The status bar at the bottom indicates 'All devices offline'. The 'Load preview' dialog has buttons for 'Finish', 'Load', and 'Cancel'. The 'Device information' tab is active, showing 'All devices offline'.

# Connect PLC and connector

