User Manual

# netLINK NL 51N-DPL

## Installation and Hardware Description


**Hilscher Gesellschaft für Systemautomation mbH**

**www.hilscher.com**

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# Table of Contents

# 1 Introduction

## 1.1 About the User Manual

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

### 1.1.1 List of Revisions

| Index | Date | Chapter | Revisions |
|---|---|---|---|
| 1 | 2010-08-13 | all | Created |
| 2 | 2011-01-31 | 4.1 | Dimensions |
| | | 8.1 | Dimensions, weight, power supply voltage |
| 3 | 2013-02-01 | 1.2 | Section *Reference to Hardware, Firmware and Software* updated |
| | | 3.3 | Section *Configuration Requirements* updated:<br>Windows® Vista and Windows® 7 added |
| | | 8.1 | Section Technical Data *netLINK NL 51N-DPL* updated |
| | | 8.2.1 | Section Technical Data *PROFINET IO Device* updated |
| | | 8.2.2 | Section Technical Data *PROFIBUS-DP Master* updated |
| 4 | 2014-04-02 | 1.3.1 | Section *Directory Structure of the DVD* updated. |

*Table 1: List of Revisions*

### 1.1.2 Conventions in this Manual

Operation instructions, a result of an operation step or notes are marked as follows:

**Operation Instructions:**

➢ <instruction>

Or

1. <instruction>
2. <instruction>

**Results:**

⇳ <result>

**Notes:**

**Important:** <important note>

**Note:** <note>

<note, where to find further information>

## 1.2 Reference to Hardware, Firmware and Software

### Hardware

| Device | Revision |
|---|---|
| NL 51N-DPL | 2 |

*Table 2: Reference to Hardware*

### Firmware

| Firmware | Revision |
|---|---|
| LN30D010.NXF | 1.0.22.0 |

*Table 3: Reference to Firmware*

### Software

| Software | Revision |
|---|---|
| SyCon.net | 1.310.x.x or higher |

*Table 4: Reference to Software*

# 1.3 Contents of the Product DVD

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

- Setup program for the configuration and diagnostics software *SYCON.net* and 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

All manuals on this DVD are delivered in the Adobe Acrobat® Reader format (PDF).

| Directory Name | Description |
|---|---|
| Documentation | Documentation in the Acrobat® Reader Format (PDF). |
| Electronic Data Sheets (e. g. EDS, GSD, GSDML) | Device Description File (not relevant for NL 51N-DPL) |
| Firmware | Loadable Firmware |
| fscommand | Files used for installation |
| Setups & Drivers | Configuration and diagnostic software SYCON.net<br>USB Driver (not relevant for NL 51N-DPL)<br>Debugger software for netSCRIPT (not relevant for NL 51N-DPL)<br>Lua for Windows (not relevant for NL 51N-DPL) |
| Supplements & Examples | Examples for SYCON.net<br>Examples for netSCRIPT (not relevant for NL 51N-DPL)<br>Links to websites about Modbus<br>Device recovery (not relevant for NL 51N-DPL) |
| Training & Podcasts | Videos about commissioning<br>Presentation about netSCRIPT (not relevant for NL 51N-DPL) |

*Table 5: Directory Structure of the DVD*

### 1.3.2 Documentation Overview

The following documentation overview gives information, for which items you can find further information and in which manual.

**Documentation for Users**

**Note:** Further information:

All manuals listed in the overview below can be found in the `Documentation` directory on the delivered DVD in Adobe Acrobat® Reader format (PDF).

| Manual | Contents | Document name |
|---|---|---|
| User Manual netLINK NL 51N-DPL | Installation and Hardware description of the netLINK NL 51N-DPL | `netLINK NL 51N-DPL UM xx EN.pdf` (this manual) |
| Operating Instruction Manual Configuration of Gateway and Proxy Devices | Description of the configuration software SYCON.net for configuration of the NL 51N-DPL device: Configuration of Gateway and Proxy Devices for netTAP, netBRICK and netLINK | `Configuration of Gateway and Proxy Devices OI xx EN.pdf` |
| Operating Instruction Manual Ethernet Device Configuration | Assignment of IP-Address for the netLINK NL 51N-DPL | `Ethernet Device Configuration OI xx EN.pdf` |

*Table 6: Documentations for netLINK NL 51N-DPL for users*

# 1.4 Legal Notes

## 1.4.1 Copyright



## 1.4.2 Important Notes

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- for the design, construction, maintenance or operation of nuclear facilities;
- in air traffic control systems, air traffic or air traffic communication systems;
- in life support systems;
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### 1.4.5 Export Regulations

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### 1.4.6 Registered Trademarks

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Adobe-Acrobat® is a registered trademark of the Adobe Systems Incorporated.

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PROFIBUS and PROFINET are registered trademarks of PROFIBUS International, Karlsruhe.

All other mentioned trademarks are property of their respective legal owners.

## 1.5 Licenses

The NL 51N-DPL device contains a license for the PROFIBUS-DP Master Link allowing the communication to a single PROFIBUS-DP Slave device.

# 2 Safety

## 2.1 General Note

The user manual, the accompanying texts and the documentation are written for the use of the products by educated personnel. When using the products, all safety instructions and all valid legal regulations have to be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

## 2.2 Intended Use

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

The device may not be opened or be used when the housing has been removed.

## 2.3 Personnel Qualification

The netLINK NL 51N-DPL is used as a part of a system which must fulfill safety and accident precaution regulations depending on the respective conditions of use. The user of the system is exclusively responsible for the fulfillment of those regulations.

Therefore the system to which the netLINK NL 51N-DPL belongs may only be used by personnel who has been informed and educated about all relevant regulations.

## 2.4 Commitment to read and understand the Manual

**Important!** Read and understand all instructions in this manual before installation or use of your device to avoid injury.

## 2.5 References Safety

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

## 2.6 Labeling of Safety Instructions

The safety instructions are pinpointed particularly. The instructions are highlighted with a specific safety symbol, a warning triangle and a signal word according to the degree of endangerment. Inside the note the danger is exactly named. Instructions to a property damage message do not contain a warning triangle.

| Symbol | Symbol (USA) | Sort of Warning or Principle |
|---|---|---|
|  | | Warning of Personal Injury |
|  | | Warning of damages by electrostatic discharge |
|  | | Principle: Mandatory read Manual |

*Table 7: Safety Symbols and Sort of Warning or Principle*

| Signal Word | Meaning |
|---|---|
| **WARNING** | Indicates a possible hazard with medium risk, which will have as consequence death or (grievous) bodily harm if it isn't avoided. |
| **CAUTION** | Indicates a minor hazard with medium risk, which could have as consequence simple battery if it isn't avoided. |
| **NOTICE** | Indicates a Property Damage Message. |
| **Note** | Indicates an important note in the manual. |

| Signal Word (USA) | Meaning (USA) |
|---|---|
|   | Indicates a Hazardous Situation Which, if not Avoided, could Result in Death or Serious Injury. |
|   | Indicates a Hazardous Situation Which, if not Avoided, may Result in Minor or Moderate Injury. |
|   | Indicates a Property Damage Message. |
| Note | Indicates an Important Note in the Manual. |

*Table 8: Signal Words*

In this document the safety instructions and property damage messages are designed according both to the international used safety conventions as well as to the ANSI standard, refer to reference safety [1].

## 2.7 Safety Instructions

To ensure your own personal safety and to avoid personal injury, you necessarily must read, understand and follow the following and all other safety instructions in this guide.

### 2.7.1 Damage by interrupting the Process

Damage can result process dependant, if the data communication in a process plant is interrupted. Clarify if damages can occur, before you remove the device from the process plant. Take care for security precautions to prevent damage of persons and property.

**WARNING!**

**WARNING**

**Damage by interrupting the Process!**

Take care for safe operation of the process plant before you remove the device from a process plant to prevent damage of persons and property.

## 2.8 Property Damage Messages

To avoid property damage respectively device destruction and to your system, you necessarily must read, understand and follow the following and all other property damage messages in this guide.

### 2.8.1 Electrical Supply Voltage

Use only 18..30 V for power supply to operate the device.

**CAUTION!**

**NOTICE**

**Device Destruction!**

Operation with more than 30 V power supply voltage will lead to destruction of the device.

### 2.8.2 Electrostatically sensitive Devices

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.

**NOTICE**

**NOTICE**

**Electrostatic Discharge**

Protect the contacts of the D-Sub-plug from electrostatic discharge which may cause damage at the device.

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge (EN 61340-5-1 und EN 61340-5-2 as well as IEC 61340-5-1 und IEC 61340-5-2).

# 3 Description and Requirements

## 3.1 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 superordinate PROFINET network. Because of its structure as plug with a DSub housing, it can be plugged directly on to the PROFIBUS-DP interface of the PROFIBUS-DP-Slave and connected to the PROFINET network via the RJ45 connector.

On the side of PROFINET, the netLINK behaves just like a usual IO Device. The process data of the DP-Slave are assigned according to the guideline of the PI User Organization as a module in the respective PROFINET Slot/Subslot.

Powers the device with 24 VDC via the COMBICON connector.

Due to the short transmission way at the PROFIBUS it is not necessary to use a PROFIBUS termination resistor.

For the configuration of the NL 51N-DPL the configuration software “SYCON.net” and “Ethernet-Device Setup” has to be used.

The device is shipped with firmware. It has to be configured with the SYCON.net configuration software for its use case.

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

The following preconditions must be met in order to operate the NL 51N-DPL device successfully:

1. A suitable power supply (24 V) as described above is required.

**NOTICE!**

**NOTICE**

**Device Destruction!**

- **The reference potential of the power supply is galvanically connected with the reference potential of the PROFIBUS.**
- **The supplied voltage may not exceed 30 V DC, otherwise device damage may occur.**

2. The configuration of the device must have been completed successfully. For this purpose, the system configurator SYCON.net is delivered with the device.

## 3.3 Configuration Requirements

The configuration software SYCON.net must be installed on a PC.

**The requirements for the PC are:**

- 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 disk space: min. 400 MByte
- DVD ROM drive
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- Keyboard and Mouse

**Note:** If the project file is saved and opened again or it is used on another PC, the system requirements need to match. Particularly the DTM need to be installed on the used PC.

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

# 4 Device Drawings and Connections

## 4.1 Dimensioned Drawing

Dimensions in mm.

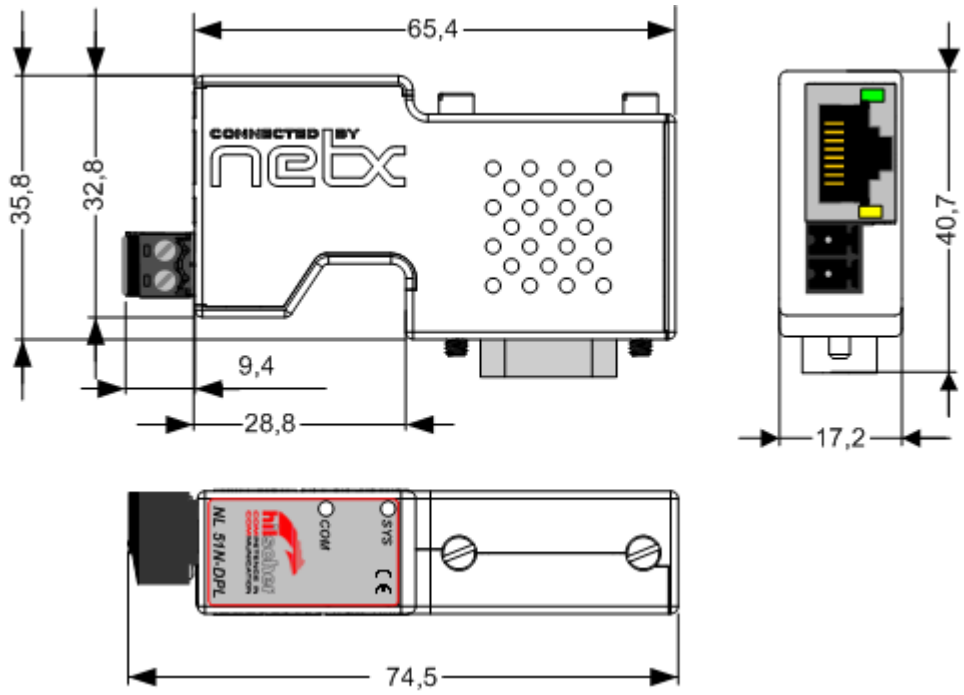
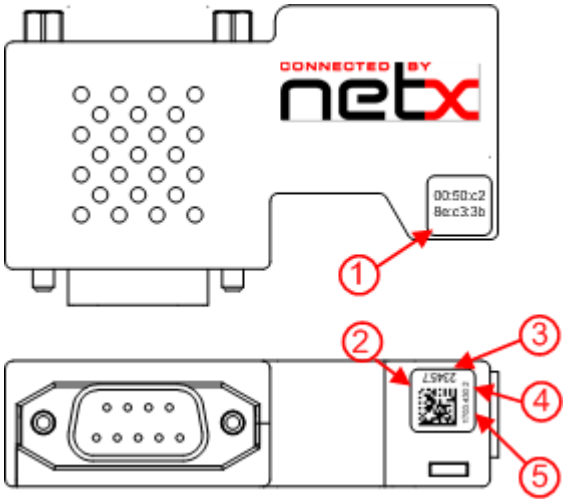



*Figure 1: Dimensioned Drawing*

## 4.2 Labels




① Label with the MAC address of the device

② Label with manufacturing data

③ Serial number of the device: 23457

④ Hardware revision number: 2

⑤ Order number of the device: 1703.430

*Figure 2: Labels*

# 4.3 Connections


*Figure 3: Connectors of the Device*

## 4.3.1 X1 Power Supply

**Power supply line pin assignment**

| Power supply line | Pin | Signal | Description |
|---|---|---|---|
|  Mini Combicon | 1 | 0 V / GND | GND der Spannungsversorgung, 1 nf / 2000V gegen Schirm / Gehäuse. |
| | 2 | 24 V | +24 V power supply |

*Table 9: Power supply line pin assignment*

The plug for this connector is part of the delivery of the device.

## 4.3.2 X2 Ethernet Interface

**Ethernet on RJ45 pin assignment**

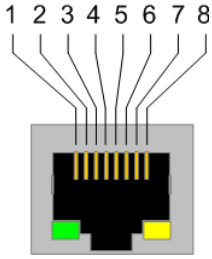
| Ethernet | Pin | Signal | Description |
|---|---|---|---|
|  RJ45 socket, female | 1 | TX+ | Transmit data positive |
| | 2 | TX– | Transmit data negative |
| | 3 | RX+ | Receive data positive |
| | 4 | Term 1 | Connected and terminated to PE via RC combination* |
| | 5 | Term 1 | |
| | 6 | RX– | Receive data negative |
| | 7 | Term 2 | Connected and terminated to PE via RC combination* |
| | 8 | Term 2 | |
| | | | * Bob Smith Termination |

*Table 10: Ethernet RJ45 pin assignment*

### 4.3.3 X3 PROFIBUS Interface

**RS-485 Profibus pin assignment**

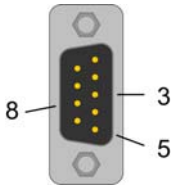
| PROFIBUS | Pin | Signal | Description |
|---|---|---|---|
|  9 pin sub-D socket, male | 3 | Rx/Tx + | Receive- / Transmit data positive. |
| | 5 | GND | Data ground, 1 nF / 2000V against PE |
| | 8 | Rx/Tx - | Receive- / Transmit data negative. |
| | Shield | PE | Metal shell on PE. |

*Table 11: PROFIBUS RS-485 pin assignment*

**CAUTION!**

**Device Destruction!**

- **The reference potential of the power supply is galvanically connected with the reference potential of the PROFIBUS.**
- **If the power supply is not taken from the PROFIBUS DP Slave, but externally supplied, this external power supply must be potential free.**

## 4.4 Schematic Diagram - Galvanic Isolation

The following schematic diagram illustrates the galvanic areas of separation.

**Important:** The PE connection of the device is done via shielding connectors of the PROFIBUS-DP plug and the shielding connector of the PROFINET IO plug via the metal housing of the Ethernet socket. The metalized outer part of the housing is on PE potential.

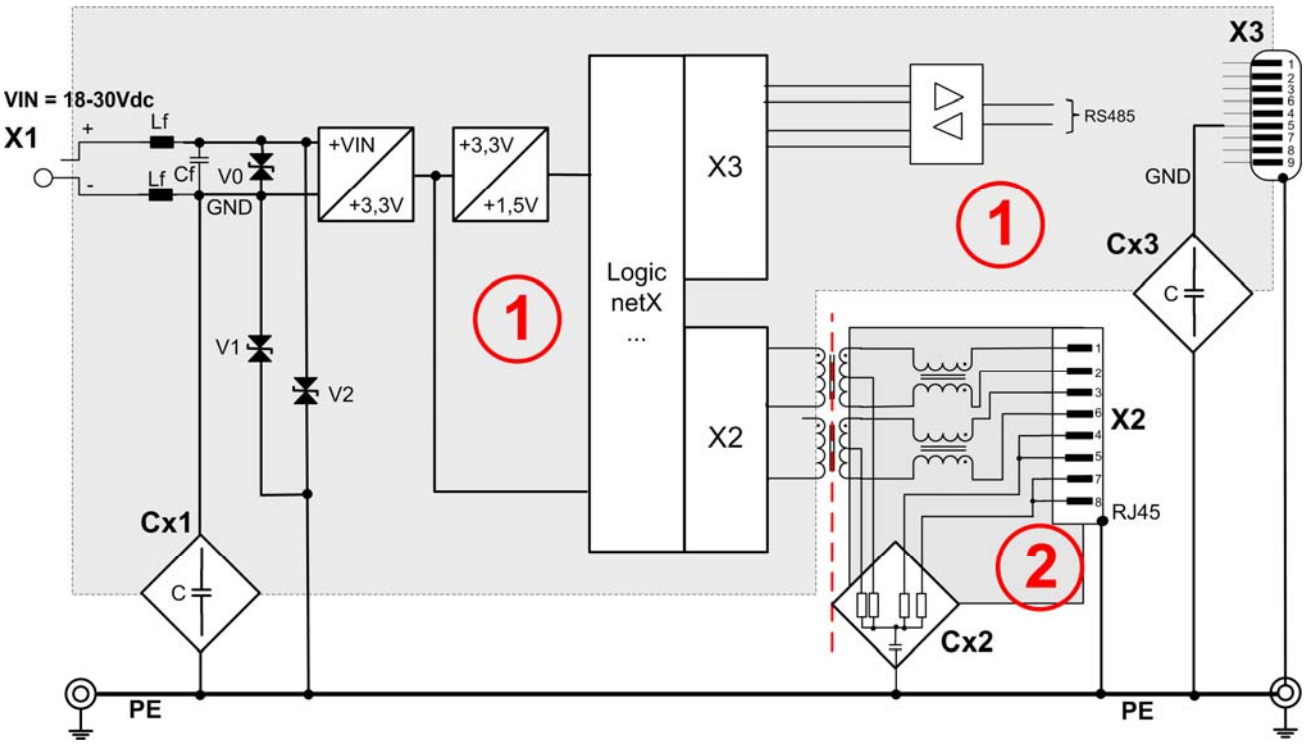



*Figure 4: Galvanic Isolation*

| Area<br>Connection | Protocol | galv. Isolation | Coupling | Coupling against PE potential | Functional earthing toPE |
|---|---|---|---|---|---|
| ① **X1** | - | no | Cx1 ①<br>V0,V1, V2 | 22 pF / 63 V<br>$U_{BR}$ = 33 ... 37 V | - |
| ② **X2** | PROFINET IO | inductive | Cx2 ② | 4 * 75 Ω, 1 nF / 2000 V | Directly via the metal connection of RJ 45 sockets |
| ① **X3** | PROFIBUS DP | no | Cx3 ① | 1 nF / 2000 V | Directly via the metal connection of D-Sub-socket |

*Table 12: Coupling NL 51N-DPL Devices*

# 5 Commissioning

## 5.1 Warnings of Damage to Property

Take care of the following warnings of damage to Property during the installation of the netLINK NL 51N-DPL device.

### 5.1.1 Electrostatically sensitive Devices

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.

**NOTICE**

**NOTICE**

**Electrostatic Discharge**

Protect the contacts of the D-Sub-plug from electrostatic discharge which may cause damage at the device.

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge (EN 61340-5-1 und EN 61340-5-2 as well as IEC 61340-5-1 und IEC 61340-5-2).

## 5.2 Mounting Instructions

The netLINK NL 51N-DPL is directly mounted on to the PROFIBUS-DP interafce of the PROFIBUS-DP Slave device and securely screwed with the fixing screws.

Via the metal collar of the D-Sub plug, the housing of the netLINK NL 51N-DPL is connected to the shielding of the PROFIBUS Slave device. Thus the metal housing of the RJ45 socket is set to the same earthing potential.

## 5.3 Ethernet Connection

For NL 51N-DPL commissioning purpose and for the PROFINET operation the Ethernet Port X2 is used. The connection to the configuration PC may be realized with an ethernet patch cable directly or indirectly via the office or plant network. In case a configuration is needed during runtimes whilst PROFINET controller and network are already in use, it is mandatory to use a PROFINET switch in between the devices

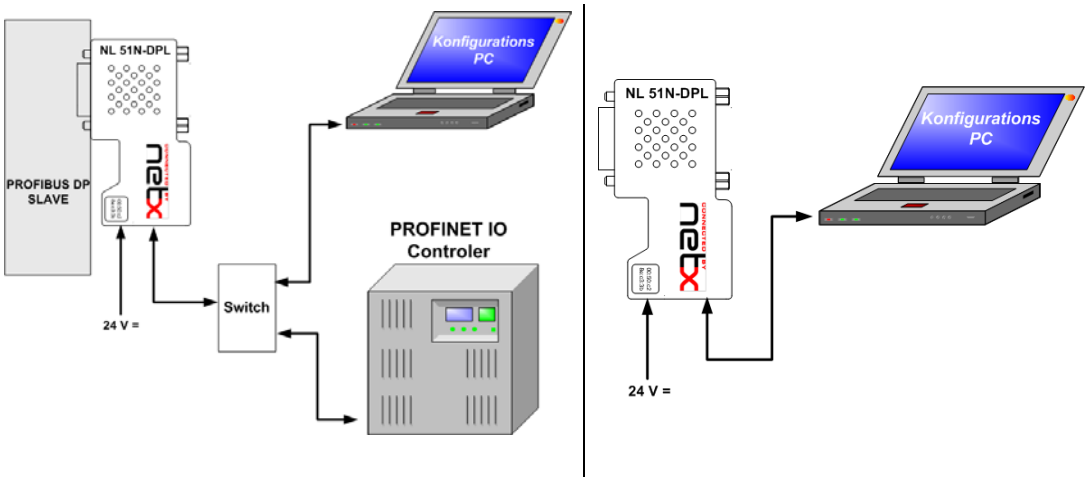



*Figure 5: Possible Connections for Configuration*

# 5.4 Configuration

By default the device is set up with IP address 0.0.0.0. For communication purpose the device needs a valid IP address first. The PROFINET controller allocates the IP address automatically during startup phase. For device configuration via the configuration PC the IP address has to be set manually.

## 5.4.1 Setting up the IP Address

Assigning an IP address is done with the software “Ethernet Device Setup”. It is installed during the setup of the SYCON.net configuration software. A network scan with this software will find Hilscher Device via ethernet broadcast messages abroad and independent of their IP address. Also devices with the IP address 0.0.0.0 will be found.

The procedure to assign an IP address is described in the user manual *Ethernet Device Configuration OI xx EN.pdf* that you can find on the product DVD in the folder `Documentation\english\1.Software\Ethernet Device Setup Utility`.

**Note:** Please consider that the intended IP address is not occupied already in your network and that it fits to the corresponding IP sub net your configuration PC belongs to. Normally the later used PROFINET IP address differs from the IP address that is used for configuration.

**Note:** In case the IP address is assigned with the Ethernet Device Setup tool using the “Netident” protocol, the address will not be saved permanently into the device. A power fail or a subsequent configuration download will reset the IP address back to the default value of 0.0.0.0. In case a reconfiguration is necessary, the IP address has to be assigned again as described above.

The assignment of the IP address enables the access of the SYCON.net configuration and its TCP/IP driver,

## 5.4.2 Establishing Communication SYCON.net – netLINK 51N-DPL

How to establish the communication between SYCON.net configuration software and the NL 51N-DPL device via the TCP/IP driver is described in the manual *Configuration of Gateway and Proxy Devices OI xx EN.pdf* in the section *Configuration of a NL 51N-DPL as Proxy*. You can find the manual on the product DVD in the folder `Documentation\english\1.Software\SYCON.net Configuration Software`.

### 5.4.3 Importing the GSD file

Commissioning the NL 51N-DPL device requires the import of the connected PROFIBUS Slave into SYCON.net to make it public in the device catalogue. Use the menu **Netzwork** > **Import Device Description** and then select **PROFIBUS GSD** for the file type.

**Note:** Ask the manufacturer of the PROFIBUS slave for the GSD file if it is not included in the delivery.

### 5.4.4 PROFIBUS Network Scan

NL 51N-DPL is preconfigured with a PROFIBUS configuration of 1.5Mbaud. This enables an immediate PROFIBUS network scan via SYCON.net software. The scan identifies the connected PROFIBUS slave and prepares the configuration of NL 51N-DPL. The scan will only complete if the GSD file of the DP-Slave has been imported before.

The procedure to activate a PROFIBUS network scan is described in the user manual *PROFIBUS DP Master DTM OI xx EN.pdf* in the chapter *Automatic Network Scan* that you can find on the product DVD in the folder `Documentation\english\1.Software\SYCON.net Configuration Software\Master configuration\PROFIBUS DP Master`.

Of course you can configure the PROFIBUS slave manually. The procedure hereto is described in the same user manual.

**Note:** Today's PROFIBUS Slave protocol chips are detecting the baudrate automatically. This ensures that nearly any PROFIBUS slave is reliable scanned at 1.5Mbaud. Just in case the connected PROFIBUS slave does not support this baudrate, you have to configure the correct baudrate in the PROFIBUS master parameter dialog of SYCON.net and download it to NL 51N-DPL.

### 5.4.5 Configuration download

After the preparation of NL 51N-DPL's configuration a download loads all parameters into the device remanently. The device will start immediately with the communication to the PROFIBUS slave. The LED COM illuminates green. After the download the device will reset the IP address back to 0.0.0.0. It is then ready to receive its IP address from the PROFINET controller.

The procedure for downloading the configuration is described in the user manual *Configuration of Gateway and Proxy Devices OI xx EN.pdf* that you can find on the product DVD in the folder `Documentation\english\1.Software\SYCON.net Configuration Software`.

### 5.4.6 Exporting the GSDML file

For the operation of the NL 51N-DPL device at a PROFINET controller a GSDML file is needed. Because of the dynamic PROFIBUS configuration of NL 51N-DPL and its immediate influence on the GSDML file, SYCON.net support the online generation of this file. Export the GSDML file after having finished the device's configuration and configure your PROFINET controller with it.

The procdure how to export a GSDML file is described in the manual *Configuration of Gateway and Proxy Devices OI xx EN.pdf* that you can find on the product DVD in the folder `Documentation\english\1.Software\SYCON.net Configuration Software`.

### 5.4.7 Configuring PROFINET Station Name/Multiple netLINKs

The PROFINET default station name the NL 51N-DPL device identifies itself is "nl51ndpl". In case multiple netLINK devices of the type and configuration are operated in a single PROFINET segment each of them must get a unique PROFINET station name to enable a clear identification for a PROFINET controller.

The first option to modify the station name is using SYCON.net configuration software. The name can be modified in the "PROFINET Device" parameter dialog. A subsequent download to the device would change the station name accordingly and the export of the GSDML file then would provide the new name to the PROFINET controller software.

The second option is the preferred one since it is not recommended to generate multiple GSDML files with SYCON.net for a device with the same configuration that just needs a different name. PROFINET features changing PROFINET station names or IP addresses of PROFINET device online via ethernet using the socalled DCP protocol after their initial configuration.

The netLINK PROFINET station name or its IP address can be modified and set permanently online at any time using the "Ethernet Device Setup" tool and the DCP protocol feature.

The procedure of how to set station name and IP address via the DCP protocol is described in the user manual *Ethernet Device Configuration OI xx EN.pdf* that you can find on the product DVD in the folder `Documentation\english\1.Software\Ethernet Device Setup Utility`.

## 5.5 Start-up Behavior

After a configuration download or return of power it will take approximately 2 s until the device is operational. The communication to the PROFIBUS slave will be initiated immediately once the device is configured for PROFIBUS. This PROFIBUS communication can never be interrupted.

Per default the device uses the IP address 0.0.0.0 on ethernet. In case the IP address has been modified with SYCON.net or “Ethernet Device Setup” Tool or the device has been operated on PROFINET already this IP address may vary.

In case there was a configuration inconsistency detected during a configuration download or a download has been interrupted the device falls back to default IP address 0.0.0.0. In this state the device can be identified again with the “Ethernet Device Setup” tool and assigned a valid IP address. Afterwards you can use SYCON.net software as usual to configure the device.

## 5.6 Decommissioning

Damage can result process dependant, if the data communication in a process plant is interrupted. Clarify if damages can occur, before you remove the device from the process plant. Take care for security precautions to prevent damage of persons and property.

**WARNING!**

**⚠ WARNING**

Take care for safe operation of the process plant before you remove the device from a process plant to prevent damage of persons and property.

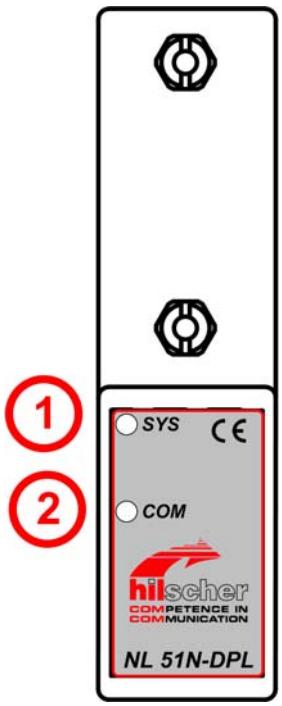
# 6 Troubleshooting

There are two levels of error analysis:

- The analysis of the status information of the LEDs at the device, see section LEDs at page 28
- The analysis of the Ethernet interfaace of the device with a PC running the software SYCON.net.
  This kind of analysis can only be done if the PC running the software SYCON.net can be looped in via a switch into the communication path of the PROFINET IO bus system.

More information concerning the online diagnosis in SYCON.net can be found in the documentation directory of the Product DVD in file *Configuration of Gateway and Proxy Devices OI xx EN.pdf* that you can find on the product DVD in the folder `Documentation\english\1.Software\SYCON.net Configuration Software`.

# 7 LEDs




The subsequent table describes the meaning of the system LED.

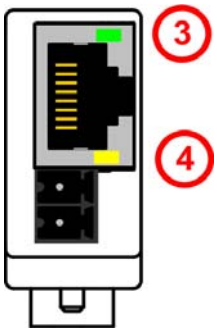
| LED | Color | State | Meaning |
|---|---|---|---|
| **SYS**<br>Number in the drawing<br>1 | **Duo LED yellow/green** | | |
| | (green) | On | Operating System running |
| | (yellow) | On | This state may occur just for a short time.<br>In case the LED is illuminating yellow permanently the device may have a hardware malfunction. |
| | (yellow/ green) | Flashing yellow/green | The bootloader is active, and loads the firmware from the FLASH memory.<br>In case this state remains active permanently the device has to be returned to Hilscher for repair. |
| | | Off | Power supply for the device is missing or hardware defect. |

*Table 13: System LED*

The subsequent table describes the meaning of the LEDs of the PROFIBUS DP Master protocol.

| LED | Color | State | Meaning |
|---|---|---|---|
| COM<br>2 | Duo LED red/green | | |
| | (green) | Flashing acyclic | No configuration or stack error |
| | (green) | Flashing cyclic | Profibus is configured, but bus communication is not yet released from the application |
| | (green) | On | Communication to the Slave is established |
| | (red) | Flashing cyclic | Communication to at least one Slave is disconnected |
| | (red) | On | Communication to one/all Slaves is disconnected |

*Table 14: LEDs PROFIBUS DP Master*




The subsequent table describes the meaning of the LEDs for the Real-Time Ethernet device.

| LED | Color | State | Meaning |
|---|---|---|---|
| **LINK**<br>RJ45<br>3 | **LED green** | | |
| | (green) | On | A connection to the Ethernet exists |
| | (off) | Off | The device has no connection to the Ethernet |
| **RX/TX**<br>RJ45<br>4 | **LED yellow** | | |
| | (yellow) | Flashing | The device sends/receives Ethernet frames |

*Table 15: LEDs PROFINET IO-RT-Device*

# 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 Interface | Transmission rate | 9,6 kBit/s up to 12 MBit/s |
| | Interface Type | RS-485 (connected to power supply potential) |
| | Connector | DSub-Plug 9-pin |
| | Automatic Baud rate detection | Not supported |
| Ethernet communication | Data transport | TCP/IP |
| | Number of connections | max. 16 TCP connections at a time |
| | PROFINET IO Controller connections | 1 |
| Ethernet Interface | Transmission rate | 10/100 MBit/s |
| | Interface Type | 100 BASE-TX, isolated |
| | Connector | RJ45- female |
| | Auto-Negotiation | supported |
| | Auto-Crossover | supported |
| Display | LED Display | SYS System Status<br>COM Communication Status<br>ACT Ethernet Activity Status<br>LNK Ethernet Link Status |
| Power supply | Voltage | 9 **...** 30 V DC |
| | Current at 18 V | typ. 80 mA |
| | Current at 24 V | typ. 70 mA |
| | Current at 30 V | typ. 53 mA |
| | Connector | Mini-COMBICON -Socket 3,81 mm 2-pin |
| Emission | | CISPR 11 Class A |
| Immunity | | EN 61131-2: 2003 |
| Environmental conditions | Temperature rang | 0 … + 50 °C |
| | Humidity | 0 … 85 % (no condensation allowed) |
| Device | Dimensions (L x W x H) | 74,5 x 40,7 x 17,2 mm |
| | Weight | appr.35 g |
| | Mounting / Installation | onto PROFIBUS Socket |
| | Protection Class | IP 20 |
| | CE Sign | Yes |
| Configuration | Software | SYCON.net |
| | Software | Ethernet-Device Setup |

*Table 16: Technical Data NL 51N-DPL*

# 8.2 Protocols

## 8.2.1 PROFINET IO Device

| Parameter | Description |
|---|---|
| Maximum number of cyclic input data | 244 bytes (Maximum number of a PROFIBUS-DP Slave) |
| Maximum number of cyclic output data | 244 bytes (Maximum number of a PROFIBUS-DP Slave) |
| Alarm Types | Process Alarm, Diagnostic Alarm, Return of SubModule Alarm |
| Supported protocols | RTC – Real Time Cyclic Protocol, Class 1 and 2 (unsynchronized)<br>RTA – Real Time Acyclic Protocol<br>DCP – Discovery and configuration Protocol<br>CL-RPC – Connectionless Remote Procedure Call<br>LLDP – Link Layer Discovery Protocol<br>SNMP – Simple Network Management Protocol |
| Used Protocols (subset) | UDP, IP, ARP, ICMP (Ping) |
| Topology recognition | LLDP, SNMP V1, MIB2, physical device |
| VLAN- and priority tagging | yes |
| Context Management by CL-RPC | Supported |
| Minimum cycle time | 1 ms |
| Baud rate | 100 MBit/s |
| Data transport layer | Ethernet II, IEEE 802.3 |
| Limitations | RT over UDP not supported<br>Multicast communication not supported<br>DHCP is not supported<br>IRT is not supported: neither synchronized RT Class 2 'flex' nor RT Class 3 'top'<br>FastStartUp not suported<br>Media Redundancy (MRP, MRRT) is not supported<br>The amount of configured IO-data influences the minimum cycle time that can be reached.<br>Supervisor-AR is not supported<br>Only 1 Input-CR and 1 Output-CR 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 (to one slave only) |
| 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 standard parameters<br>Max. 237 bytes application specific parameters |
| Acyclic communication | DP V1 Class 1 Read/Write, Alarm |
| Baud rate | 9,6 kBits/s,<br>19,2 kBits/s,<br>31,25 kBits/s,<br>45,45 kBits/s<br>93,75 kBits/s,<br>187,5 kBits/s,<br>500 kBits/s,<br>1, 5 MBits/s,<br>3 MBits/s,<br>6 MBits/s,<br>12 MBit/s<br>Auto baudrate detection is not supported |
| Data transport layer | PROFIBUS FDL |
| Limitations | DP V1 class 2 services are not supported<br>DP V2 services are not implemented |
| Reference to firmware/stack version | V2.4.x.x |

*Table 18: Technical Data PROFIBUS-DP Master Link Protocol*

# 9 Appendix

## 9.1 List of Figures



## 9.2 List of Tables

## 9.3 Contacts

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