

# PROFINET Interface

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Manual



**Documentation of the PROFINET Interface of the following  
Drives:**

- **C1150-PN-XC-0S/1S**
- **C1250-PN-XC-0S/1S**
- **C1450-PN-VS-0S/1S**
- **E1450-PN-QN-0S/1S**
- **E1250-PN-UC**

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#### Note

The information in this documentation reflects the stage of development at the time of press and is therefore without obligation. NTI AG reserves itself the right to make changes at any time and without notice to reflect further technical advance or product improvement.

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## 1 System overview

PROFINET is the open real-time Ethernet network, in this manual the LinMot profile drives are described. The LinMot drives act as slave in this network and is implemented with the TPS1 chip from Renesas.

For further information on the PROFINET fieldbus protocols please visit:

<http://www.profibus.com/>

Programming examples provided by LinMot are listed under: <http://www.linmot.com/index.php?id=141>

### 1.1 References

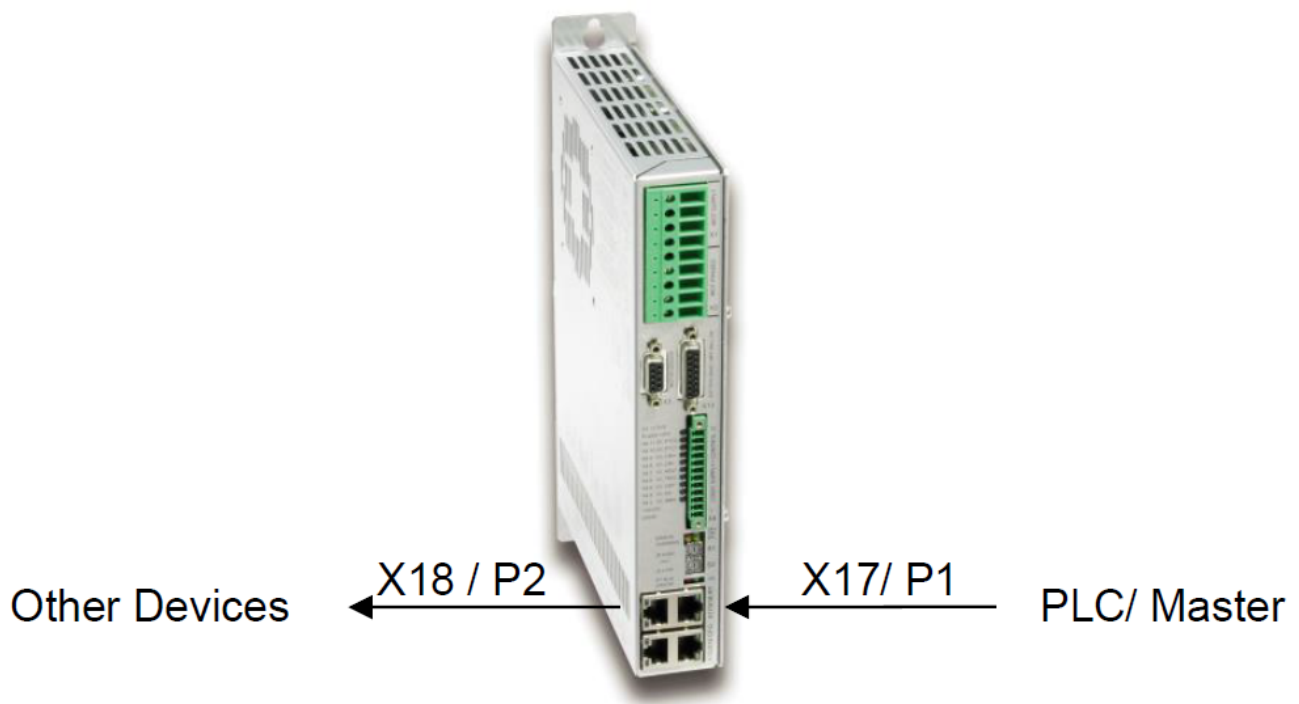
All user manuals are distributed with the LinMot-Talk software the newest versions can be downloaded from the LinMot homepage in the download section.

Ref	Title	Source
1	User Manual Motion Control SW	<a href="http://www.linmot.com">www.linmot.com</a>
2	LinMot Drive Configuration over Fieldbus Interfaces SG5	<a href="http://www.linmot.com">www.linmot.com</a>

### 1.2 Port assignement



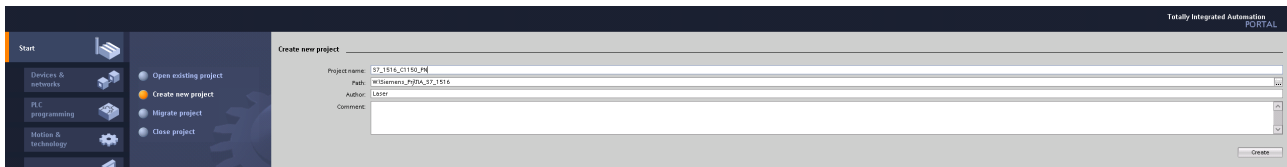
**Attention:** Within the PROFINET network normally the topology is defined, for easy setup and replacement of devices. The real time Ethernet RJ45 connector X17 is the P1 port and the real time RJ45 connector X18 is the P2 port in this context.



## 2 Setup in a PLC

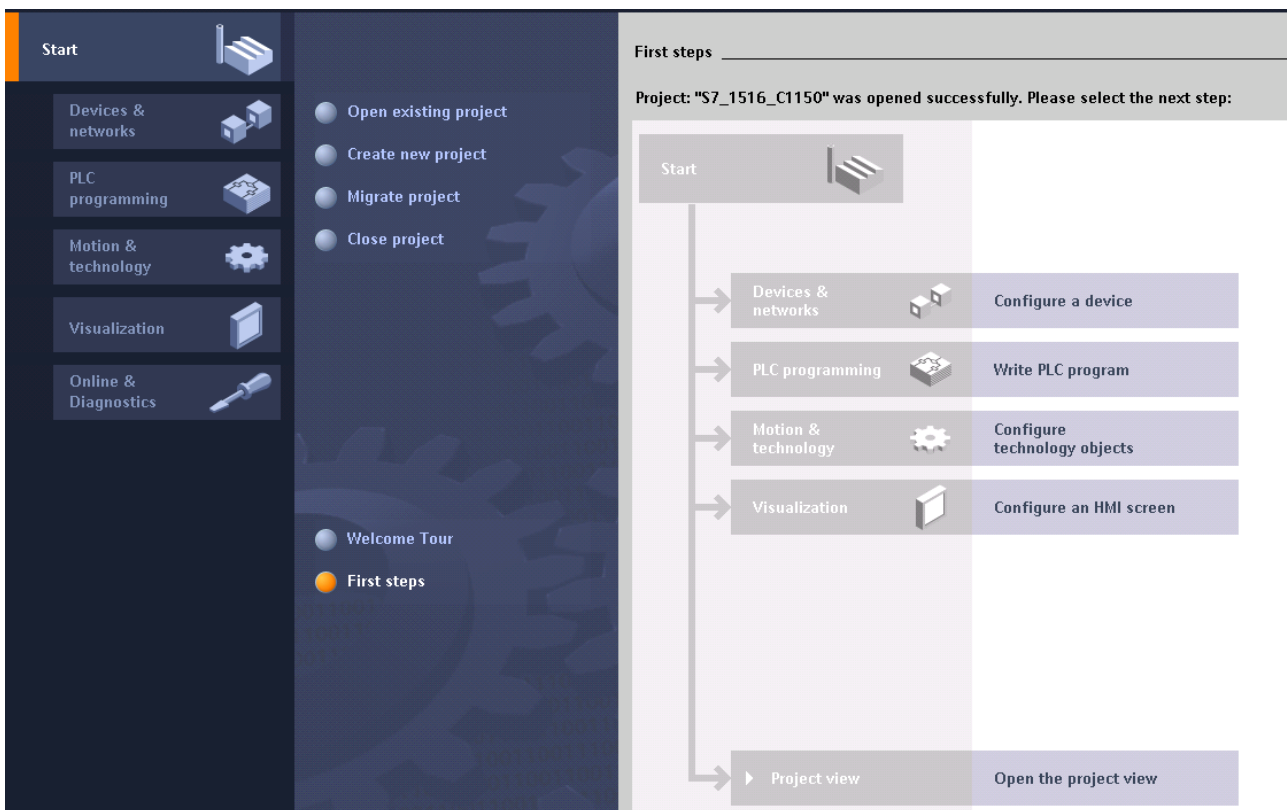
In the following steps the integration of a LinMot EtherCAT Servo Drive in the PLC is described. In the example a SIEMENS Simatic S7-1500 PLC and a LinMot C1150-PN-XC drive with a PnP capable motor is used. It is assumed that PLC and Drive are powered and connected to each other.

### 2.1 Create a new Project

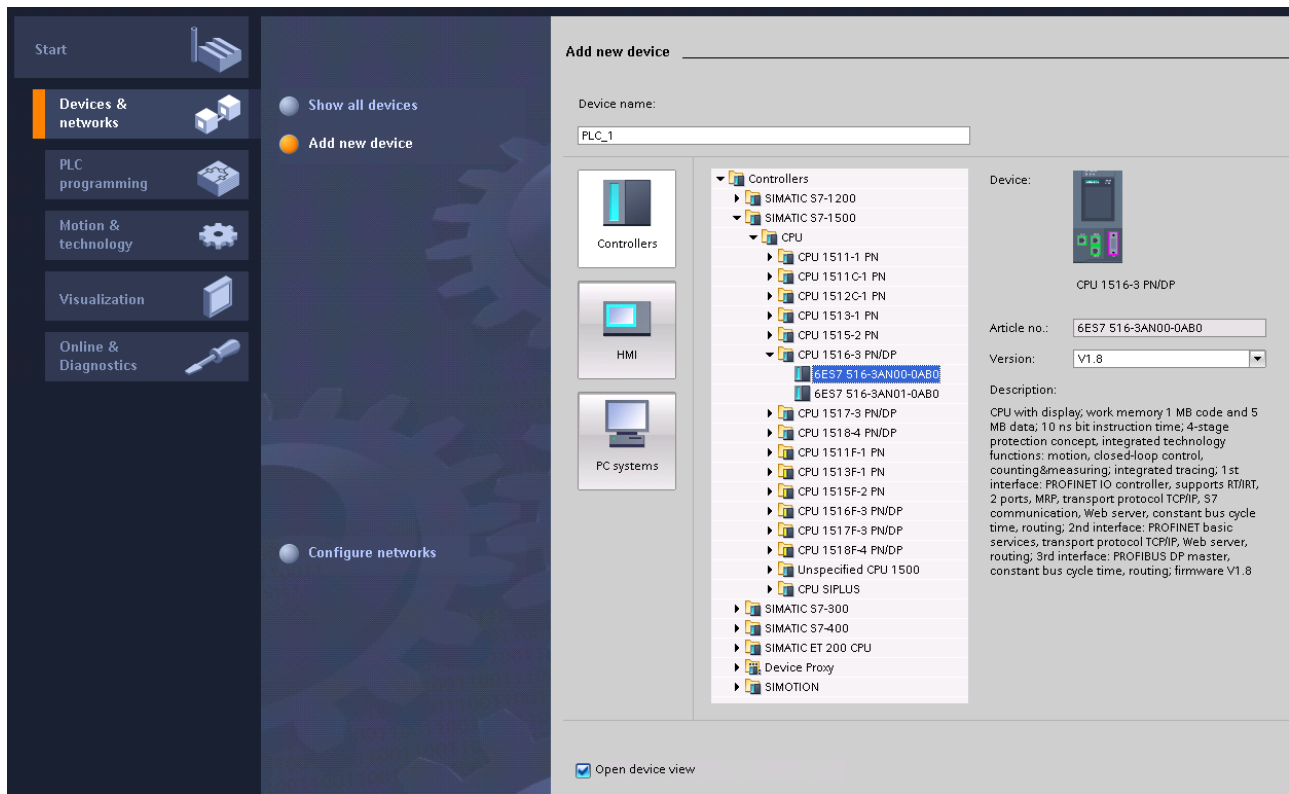


create new project

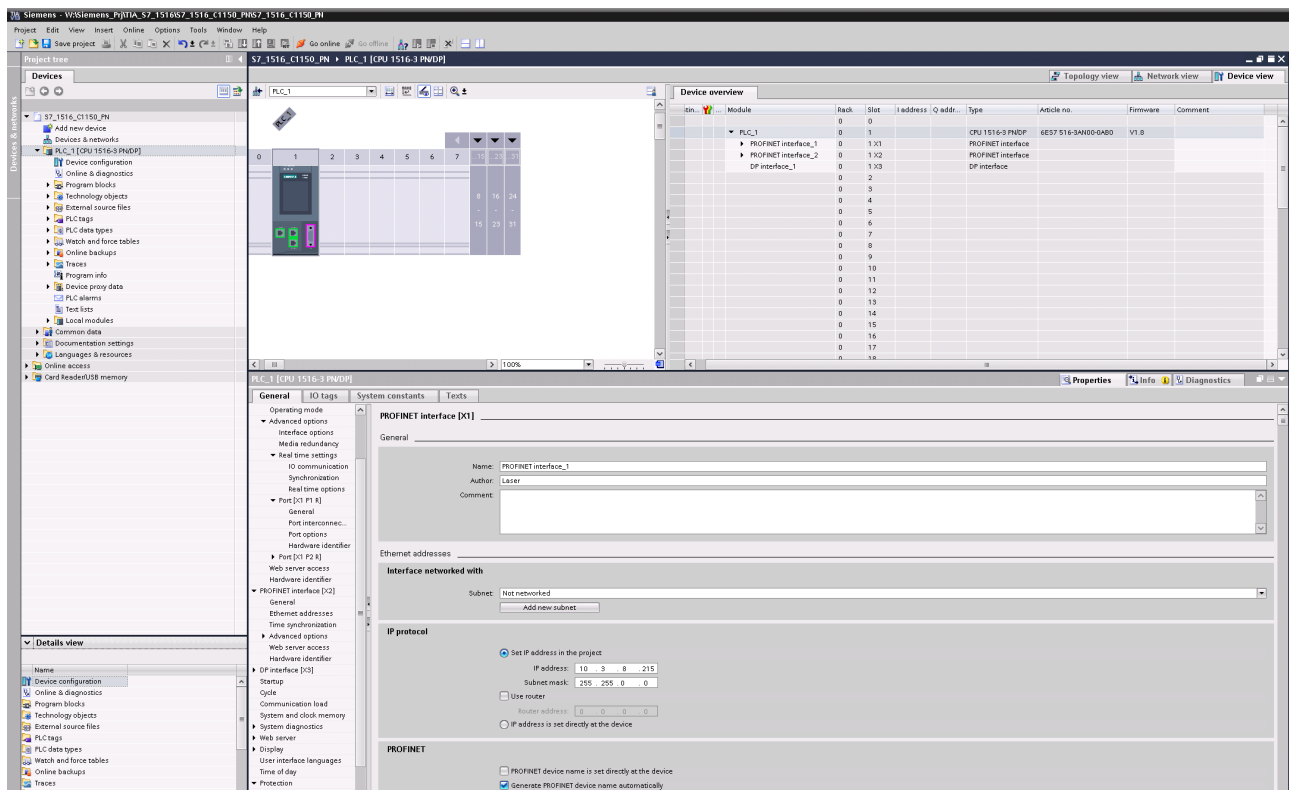
### 2.2 Configure PLC Device



Configure used PLC device

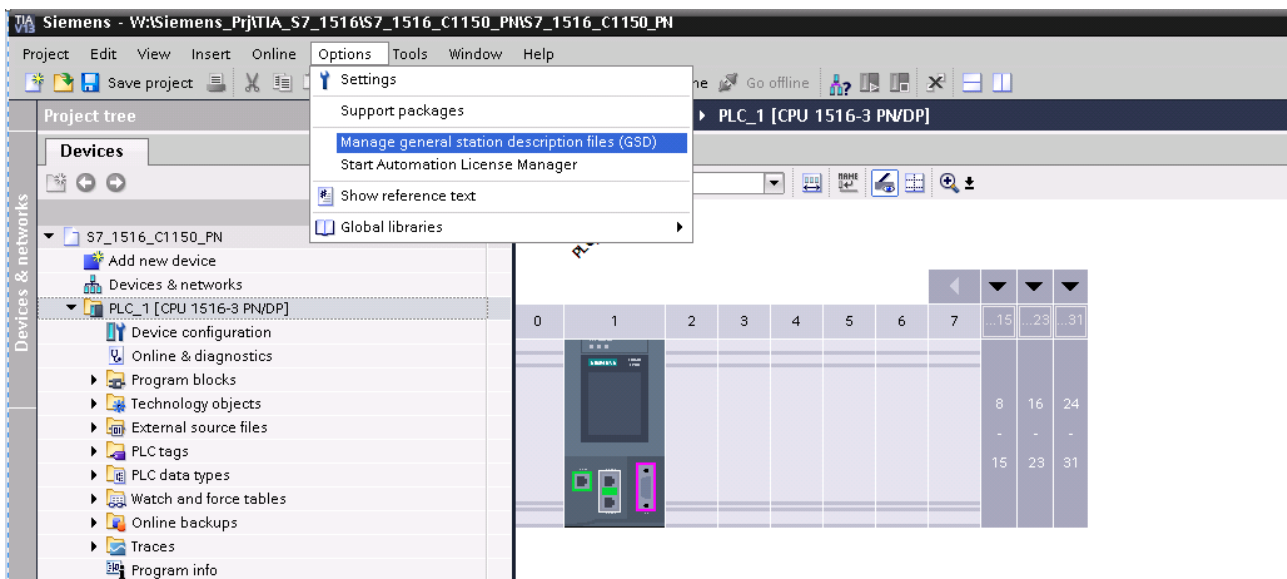


Select PLC device.

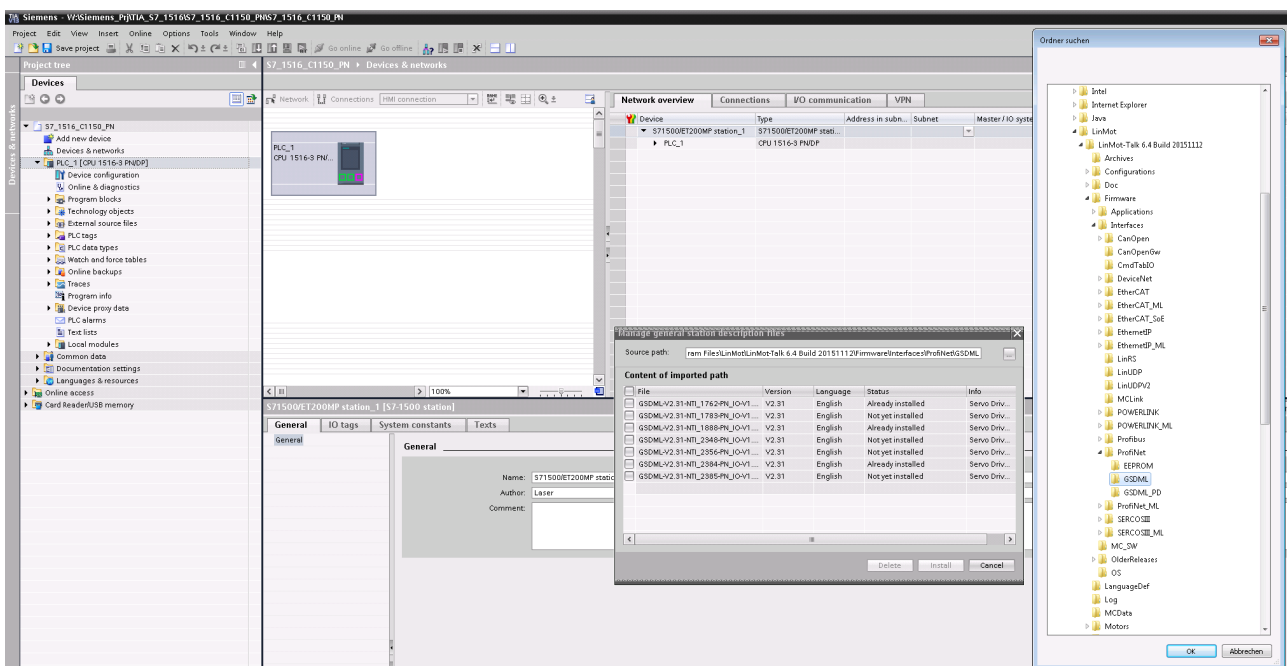


Configure the PROFINET, set the PLC network address.

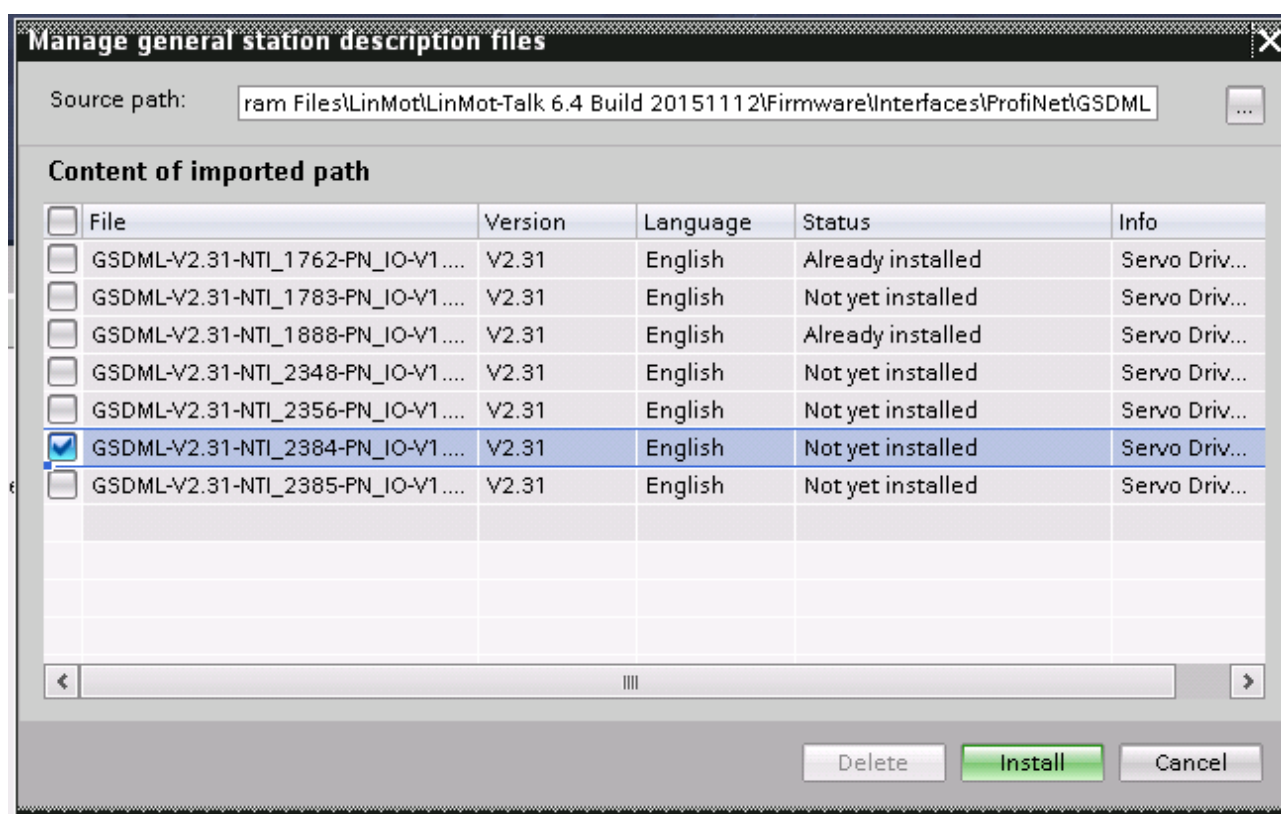
## 2.3 Configure LinMot Drive



If not installed already install linMot GSD-file.

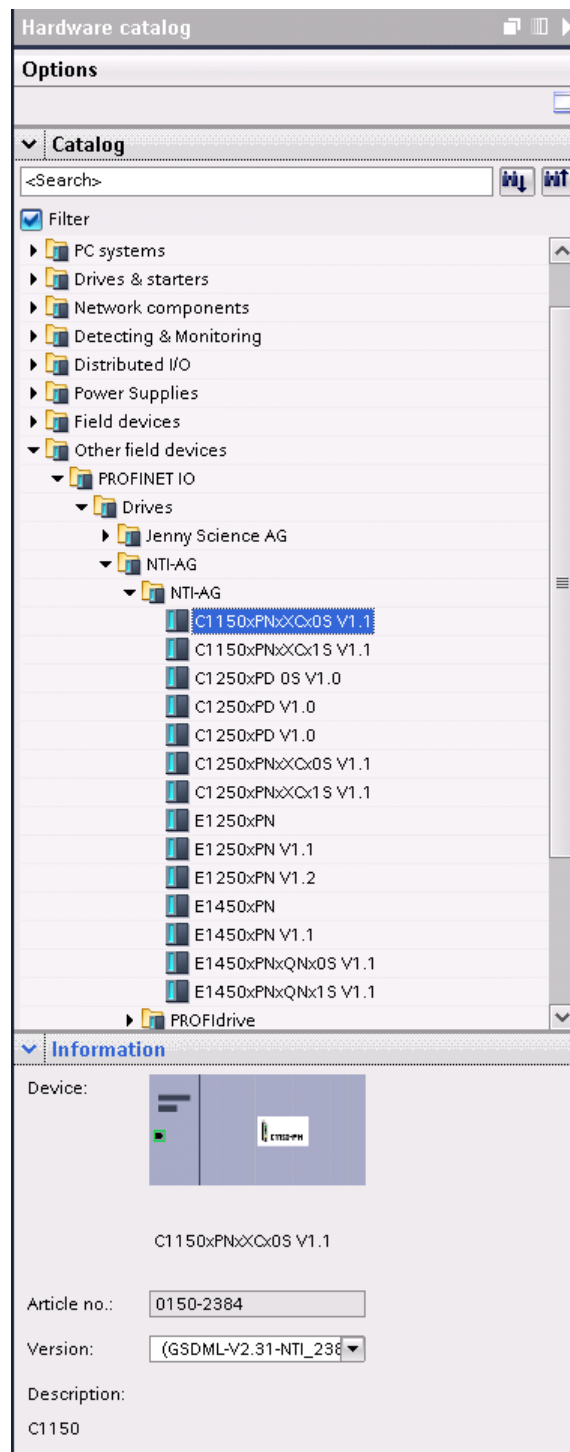


Select Installation path of the MinMot GSD-files.

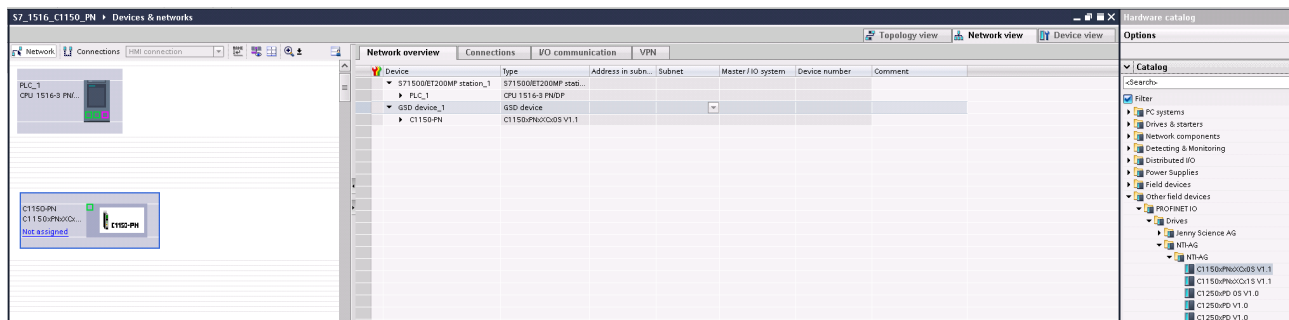


Select wanted device.

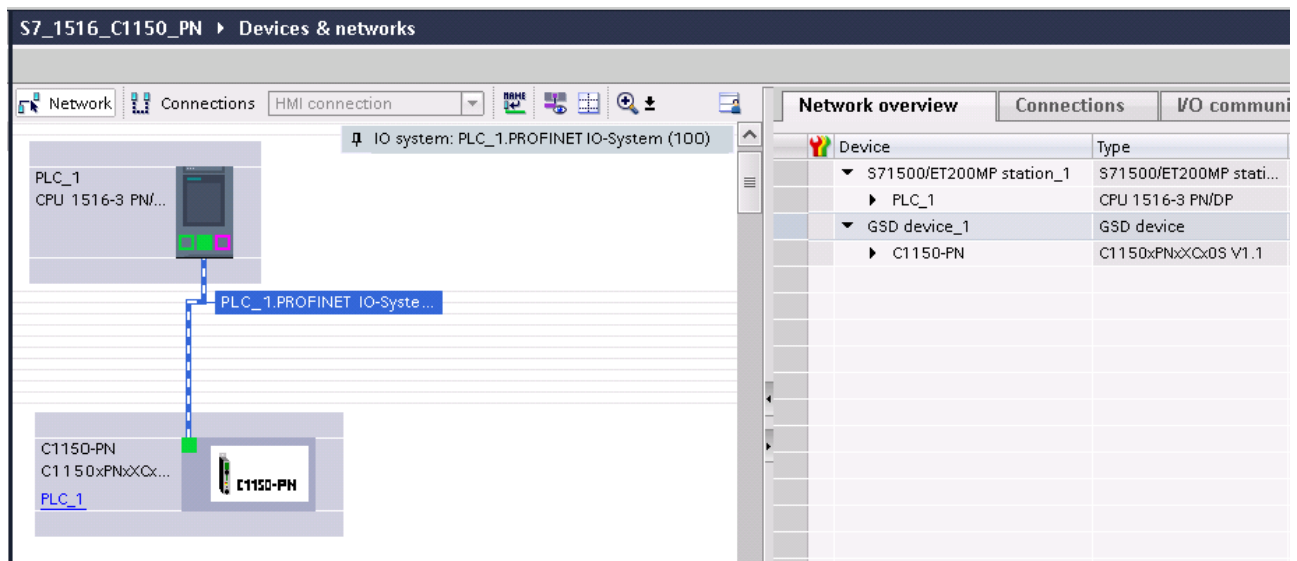




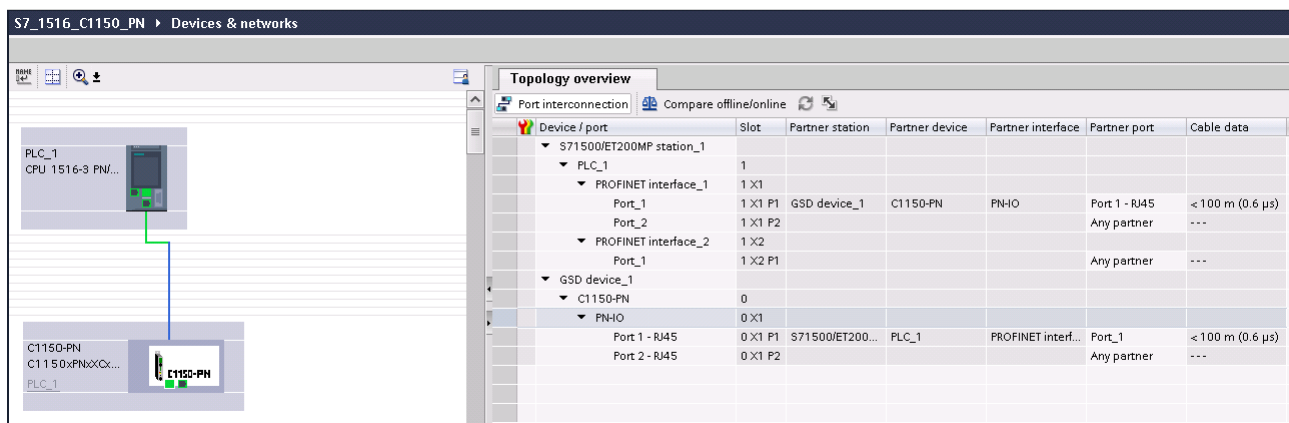
In the Hardware catalog select desired device.



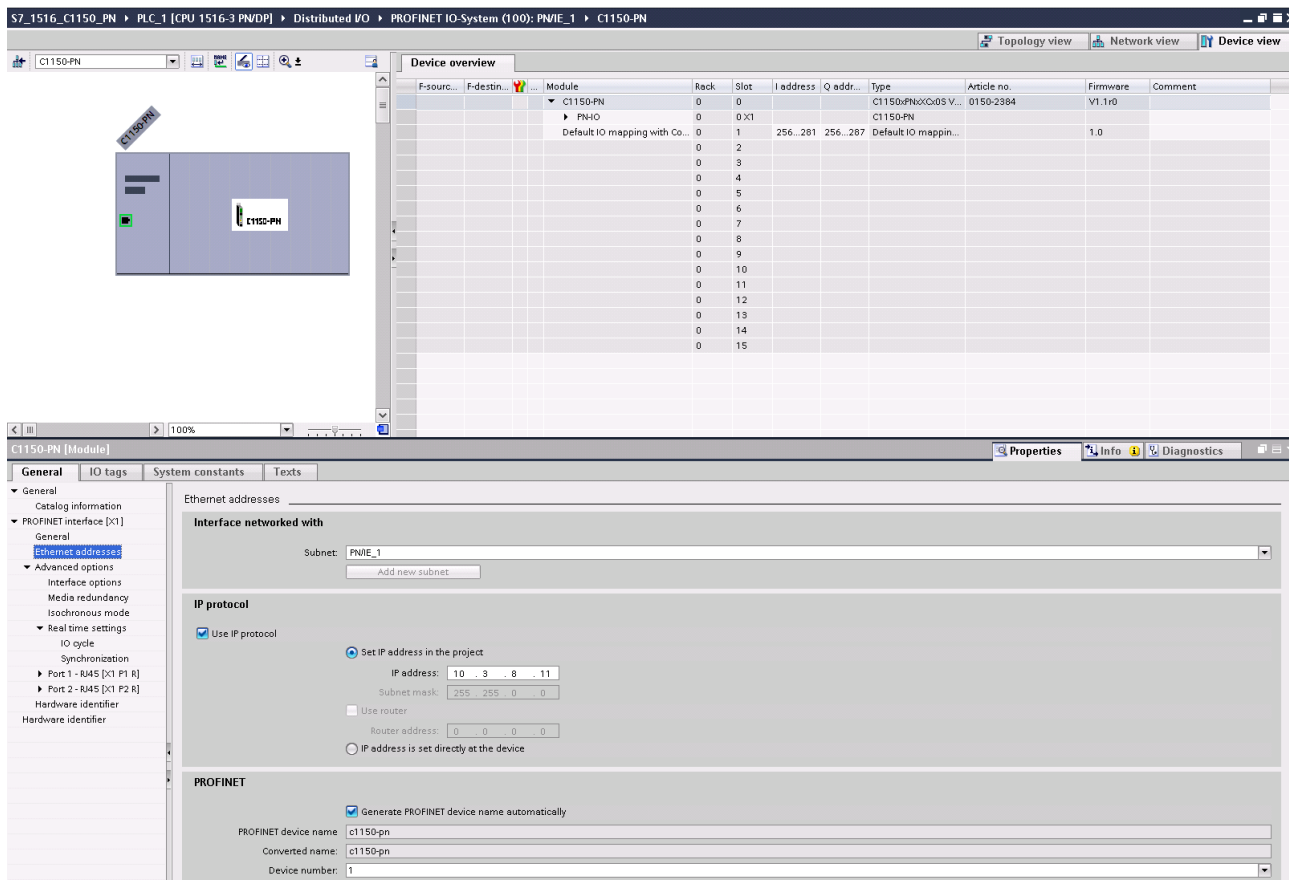
Drag and drop it from the hardware catalog to the network view.



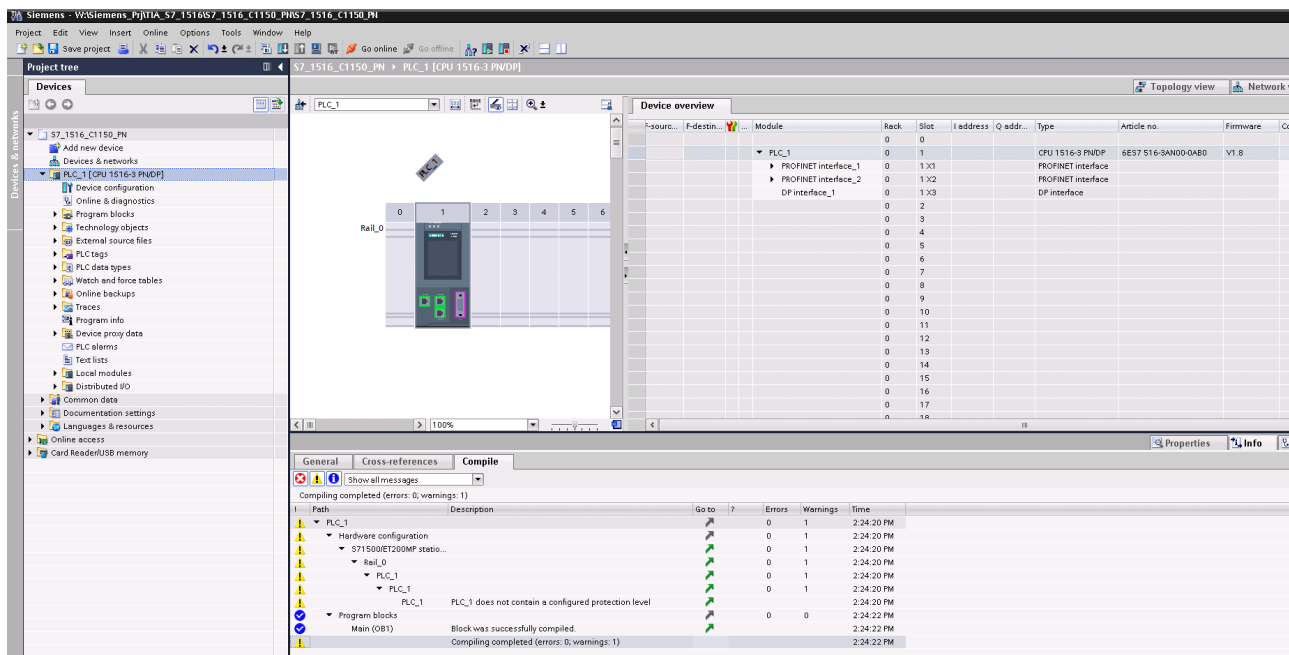
Connect the PROFINET of the drive to the PLC.




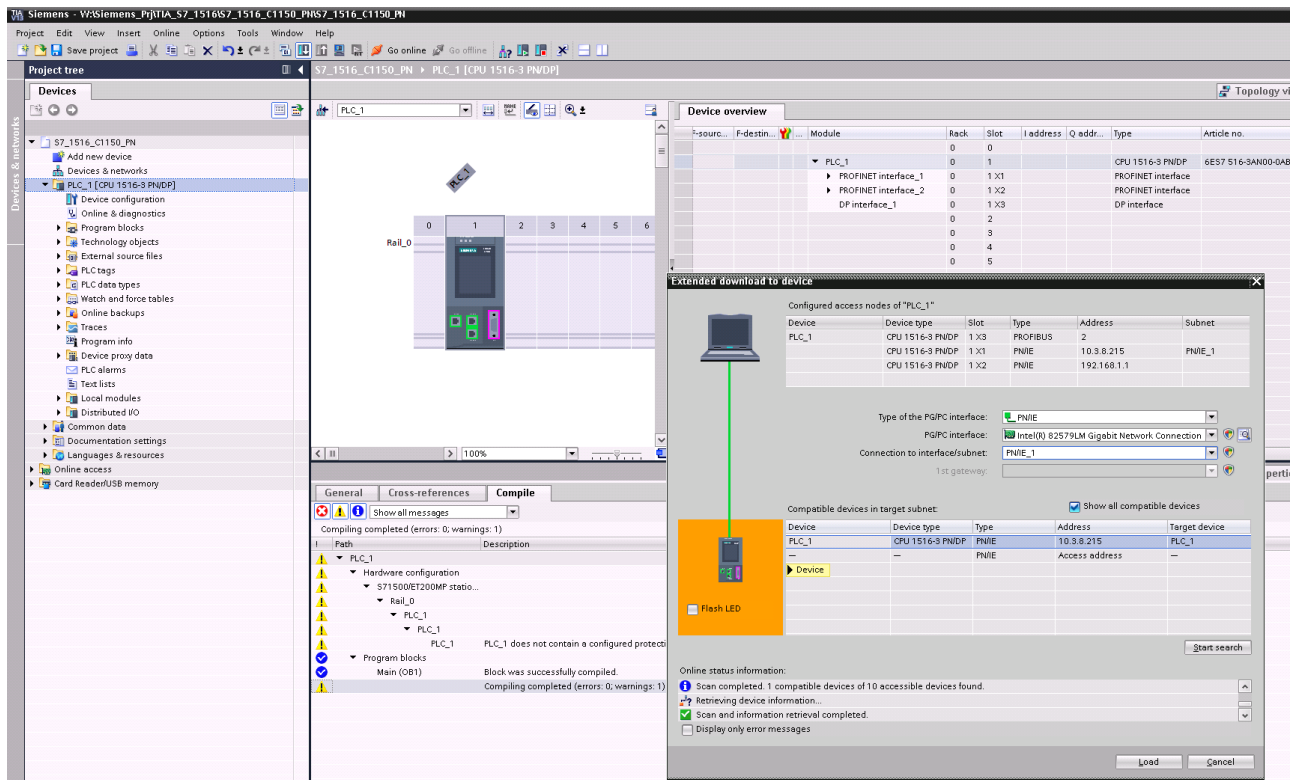
In the Topology view define the connection topology



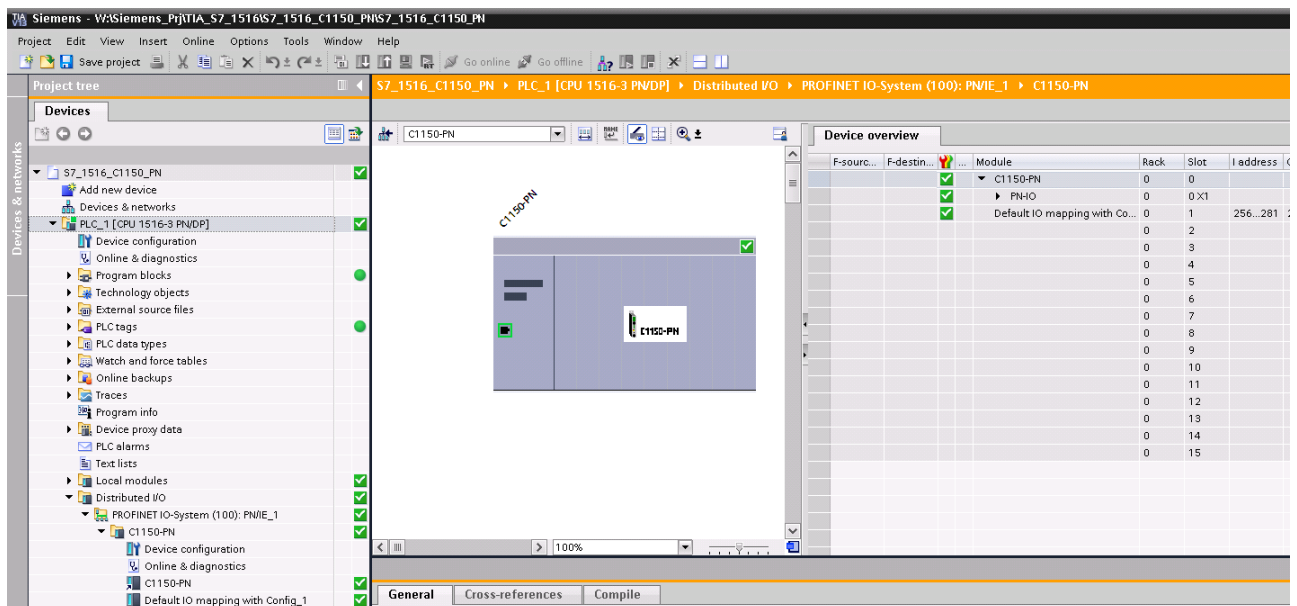
Configure the network address of the drive.  
By default in slot 1 of the PN-IO communication the “Default IO mapping with Config” is plugged, which is suitable for most applications.



Compile the Configuration by pressing the  button.



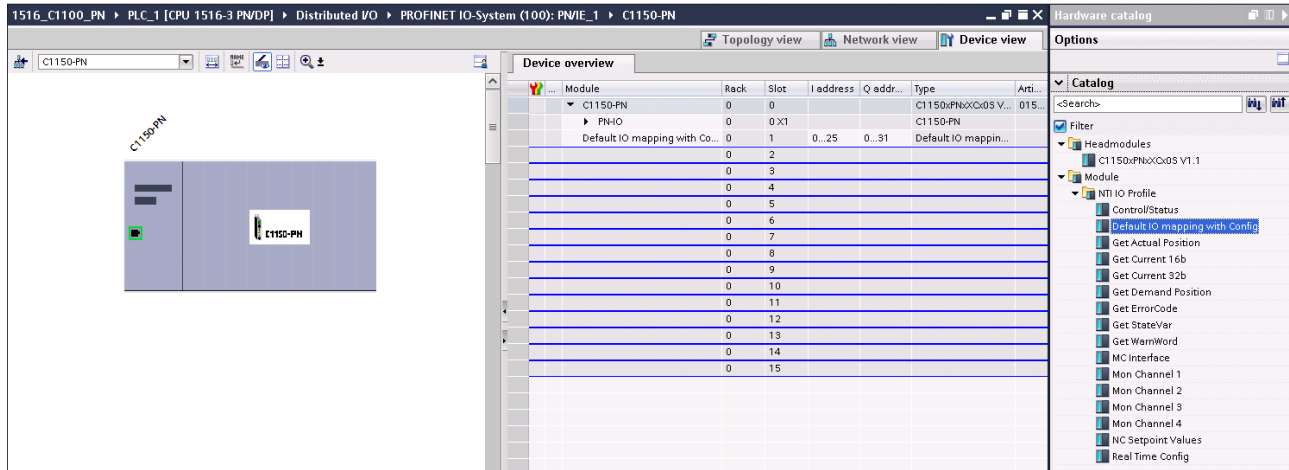
Download the configuration



After the successful download of the configuration the PROFINET IO communication should be established and the green realtime bus LED on the drive is on.

### 3 Process Data Object (PDO) Configuration

The cyclic process data is configured in the master and transmitted to the slave during startup. The data Object modules could be configured by drag and drop to the device slots 1..15.



Overview of the supported Process Data Objects Modules

By default the module "Default IO mapping with Config" is plugged into Slot 1, with this module most application should be well supported.

#### 3.1 Bidirectional PDO Modules

##### 3.1.1 Default IO mapping with Config

###### 3.1.1.1 Output Data

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 16</b>	<b>32</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	ControlWord	Word16
2	2	2	Motion Command Header	Word16
3,4	4	4	Motion Command parameter 1	Word32
5,6	4	8	Motion Command parameter 2	Word32
7,8	4	12	Motion Command parameter 3	Word32
9,10	4	16	Motion Command parameter 4	Word32
11,12	4	20	Motion Command parameter 5	Word32
13	2	24	Config Header	Word16
14	2	26	Config Index	Word16
15,16	4	28	Config Value	Word32

For the meaning of the „Control Word“ and the „Motion Command interface“ refer to [1], for the „Real Time Config Interface“ refer to [2].

###### 3.1.1.2 Input Data

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 16</b>	<b>26</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>

Index	Size [Byte]	Byte Offset	Name	Data Type
1	2	0	StateVar	Word16
2	2	2	StatusWord	Word16
3	2	4	WarnWord	Word16
4,5	4	6	Demand Position	Word32
6,7	4	10	Actual Position	Word32
8,9	4	14	Demand Current	Word32
10	2	18	Config Status Word	Word16
11	2	20	Config Index Response	Word16
12,13	4	22	Config Value Response	Word32

For the meaning of the variables 1-6 refer to [1], for the „Real Time Config Interface“ refer to [2].

### 3.1.2 Control/Status

#### 3.1.2.1 Output Data

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 1</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	ControlWord	Word16

#### 3.1.2.2 Input Data

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 1</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	StatusWord	Word16

### 3.1.3 Real Time Config

For the meaning of the „Real Time Config Interface“ refer to [2].

#### 3.1.3.1 Output Data

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 4</b>	<b>8</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	Config Header	Word16
2	2	2	Config Index	Word16
3,4	4	4	Config Value	Word32

#### 3.1.3.2 Input Data

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 4</b>	<b>26</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	Config Status Word	Word16

Index	Size [Byte]	Byte Offset	Name	Data Type
2	2	2	Config Index	Word16
3,4	4	4	Config Value Response	Word32

### 3.2 Output PDO Modules

#### 3.2.1 MC Interface

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 3</b>	<b>22</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
2	2	0	Motion Command Header	Word16
3,4	4	2	Motion Command parameter 1	Word32
5,6	4	6	Motion Command parameter 2	Word32
7,8	4	10	Motion Command parameter 3	Word32
9,10	4	14	Motion Command parameter 4	Word32
11,12	4	18	Motion Command parameter 5	Word32

#### 3.2.2 NC Setpoint Values

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 15</b>	<b>12</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1,2	4	0	Position Setpoint	Word32
3,4	4	4	Velocity Setpoint	Word32
5,6	4	8	Acceleration Setpoint	Word32

### 3.3 Input PDO Modules

#### 3.3.1 Get StateVar

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 2</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	StateVar	Word16

#### 3.3.2 Get Actual Position

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 5</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Actual Position	Int32

### 3.3.3 Get Demand Position

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 6</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Demand Position	Int32

### 3.3.4 Get WarnWord

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 7</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	WarnWord	Word16

### 3.3.5 Get ErrorCode

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 8</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	ErrorWord	Word16

### 3.3.6 Get Current 32b

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 9</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Demand Current	Int32

### 3.3.7 Mon Channel 1

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 10</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Monitoring Channel 1	Word32

### 3.3.8 Mon Channel 2

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 11</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Monitoring Channel 2	Word32

### 3.3.9 Mon Channel 3

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 12</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Monitoring Channel 3	Word32



**3.3.10 Mon Channel 4**

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 13</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	4	0	Monitoring Channel 4	Word32

**3.3.11 Get Current 16b**

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>Tlg 14</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1	2	0	Demand Current	Int16

## 4 PROFINET Parameters

### 4.1 Parameters



**Attention:** The PROFINET Interface has an additional parameter tree branch (Parameters → Profinet), which can be configured with the distributed LinMot-Talk software.

With these parameters, the PROFINET behaviour can be configured. The LinMot-Talk software can be downloaded from <http://www.linmot.com> under the section download, software & manuals.

#### 4.1.1 ProfiNet\Dis-/Enable

With the Dis-/Enable parameter the LinMot Servo Drive can be run without the Ethernet PROFINET Interface going online. So in a first step the system can be configured and run without any bus connection.

##### PROFINET\Dis-/Enable

Disable	Servo Drive runs without PROFINET.
Enable	<b>Servo Drive runs with PROFINET connection.</b>

**IMPORTANT:** If the PROFINET Interface is disabled, the integrated TPS1-ASIC rests in reset state! No messages will be sent to other devices connected to the PROFINET-Network via the servo drive.

#### 4.1.2 ProfiNet\Byte/Word Order\Byte Order

Defines the used byte order.

##### PROFINET\Byte/Word Order\Byte Order

Reversed	<b>Byte order is reversed. For S7 PLCs select reversed.</b>
Not reversed	Byte order is not reversed.

#### 4.1.3 ProfiNet\Byte/Word Order\Word Order

Defines the used word order.

##### PROFINET\Byte/Word Order\Word Order

Reversed	Word order is reversed.
Not reversed	<b>Word order is not reversed.</b>

#### 4.1.4 ProfiNet\Byte/Word Order\MC CMD Intf Par Order

Defines the used parameter word order.

##### PROFINET\Byte/Word Order\MC CMD Intf Order

Reversed	Order is reversed. CMD Header - Par word 1 – Par word 0 - Par word 3 - Par word 2 - etc...
Not reversed	<b>Order is not reversed. CMD Header - Par word 0 - Par word 1 - Par word 2 - Par word 3 - etc...</b>

#### 4.1.5 ProfiNet\Monitoring Channels

Defines the source variable by UPID of the four monitoring channels.

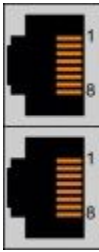
**PROFINET Monitoring Channels**

Channel 1 UPID	Source UPID for Monitoring Channel 1
Channel 2 UPID	Source UPID for Monitoring Channel 2
Channel 3 UPID	Source UPID for Monitoring Channel 3
Channel 4 UPID	Source UPID for Monitoring Channel 4

## 5 Connecting to the PROFINET Network

### 5.1 Pin Assignment of the Connectors X17-X18

The Ethernet/IP connector is a standard RJ45 female connector with a pin assignment as defined by EIA/TIA T568B:

X17 - X18		RealTime Ethernet Connector		
		Pin	Wire color code	Assignment 100 BASE-TX
		1	WHT/ORG	Rx+
		2	ORG	Rx-
		3	WHT/GRN	Tx+
		4	BLU	-
		5	WHT/BLU	-
		6	GRN	Tx-
		7	WHT/BRN	-
		8	BRN	-
		case	-	-
RJ-45	Use standard patch cables (twisted pair, S/UTP, AWG26) for wiring. This type of cable is usually referred to as a "Cat5e-Cable".			

X17 is the PROFINET port P1 and X18 the port 2 P2.

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