

**ELCO**



**ABSOLUTE ROTARY ENCODER**

**PROFINET**

**----- Encoder Manual**



**TIANJIN ELCO AUTOMATION CO., LTD.**

**11/2024**

**Version 1.0**

## Preface

### 1. Scope of application of this manual

It's for ELCO multi-turn encoder products with Profinet protocol.

From the information in the manual, you can connect the controller in Profinet mode to run multi-turn encoder products on the Profinet bus.

### 2. Basic knowledge required:

This manual assumes that you have a basic knowledge of electrical and automation engineering.

This manual describes each component based on valid data at the time of release.

New components and parameter adjustments are updated in the new manual.

### 3. Guide:

This manual describes the hardware and use of multi-turn encoders under the Profinet protocol.

Coverage includes:

- Installation and wiring
- Technical characteristics
- Using examples
- Technical parameters

### 4. Technical support:

This manual describes the product characteristics and usage of multi-turn encoders as comprehensively as possible. If you have any questions or other questions regarding this product, please contact local ELCO office or call the service hotline 400-608-4005.

You can also visit the ELCO website to learn more about automation products.

TIANJIN ELCO AUTOMATION CO., LTD. [www.elco-holding.com.cn](http://www.elco-holding.com.cn)

ELCO Industrie Automation GmbH [www.elco-automation.de](http://www.elco-automation.de)

### 5. Liability exemption:

We have checked the consistency of the contents in the manual with the hardware and software. However, the possibility of deviation is not excluded, and the contents cannot be guaranteed to be completely consistent with the hardware and software.

The data parameters have been tested as required, and the necessary modifications will be improved in the new version.

### 6. Copyright notice

## Contents

Preface.....	2
1. Product Overview .....	4
2. Technical characteristics .....	4
3. Installation dimension .....	6
4. Using examples .....	7

# 1. Product Overview

## 1.1 Introduction

The Elco Profinet multi-turn absolute encoder meets the standard Profinet Industrial Ethernet protocol. The encoder has the functions of intelligent diagnosis and high-speed data transmission. It can realize the high-precision measuring of absolute position and speed in industrial automation applications.

## 1.2 Product Introduction

Profinet multi-turn encoder provides real-time position, real-time speed, direction setting, single-turn resolution setting, total measuring range setting, preset value setting and more.

## 1.3 Features



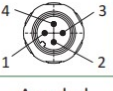

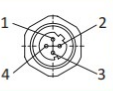

- LED and screen status indication, online diagnosis and channel protection
- It has configurable parameters such as rotation direction, single-turn resolution, total measuring range, etc.

# 2. Technical characteristics

## 2.1 Interface Description

This picture is a schematic diagram of Profinet multi-turn encoder.

### TERMINAL ASSIGNMENT

Function	M12 connector						
Bus Port 1	Signal	Transmit data+	Receive data+	Transmit data-	Receive data-		
	Abbreviation	TxD+	RxD+	TxD-	RxD-		
	Pin number	1	2	3	4		
Power Supply	Signal	Voltage+	-	Voltage-	-		
	Abbreviation	+V	-	0 V	-		
	Pin number	1	2	3	4		
Bus Port 2	Signal	Transmit data+	Receive data+	Transmit data-	Receive data-		
	Abbreviation	TxD+	RxD+	TxD-	RxD-		
	Pin number	1	2	3	4		

The Elco Profinet multi-turn absolute encoder meets the standard Profinet Industrial Ethernet protocol. The encoder has the functions of intelligent diagnosis and high-speed data transmission. It can realize the high-precision measuring of absolute position and speed in industrial automation applications.

## 2.2 Hardware parameters

Power input	+24 V DC
Input voltage	10 ... 30 V DC
Operating temperature	-40 ... 80 °C
Storage temperature	-45 ... 85 °C
Vibration resistance	10 g, 10 ... 2000 Hz
Impact resistance	50 g, 11 ms
Shaft load	80 N Axial / 160 N Radial
Protection class	IP65
Bearing life	10 <sup>9</sup> turns

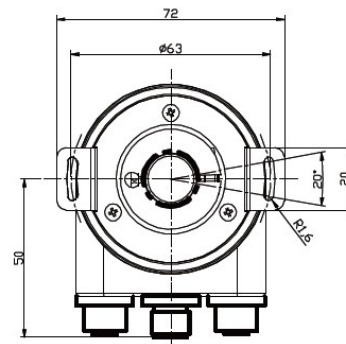
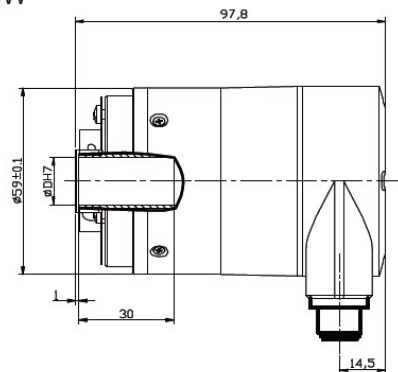
## 2.3 LED indication function

Indicator name	Indicator status	Indicator meaning	Reason
L/A	Off	Not connected to the network	1. Network cable failure 2. Gateway damage
	Orange flash	Network connection is being established	Data is connecting
	Orange light	Network data is exchanging	
Power	Off	No power supply	1. Power supply cable failure
	Green	Normal power supply	
ERR	Off	No communication error	
	Red	No communication connection established	1. Network cable failure 2. Configuration error

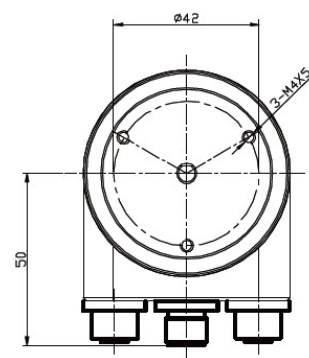
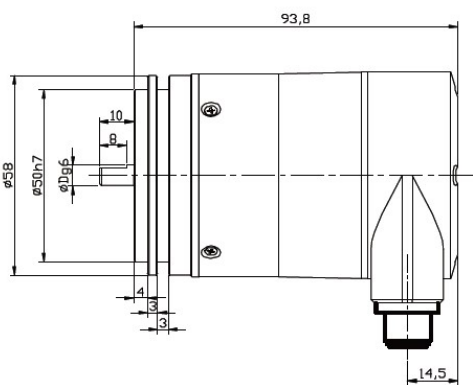
### 3. Installation dimension

#### 3.1 dimension drawing

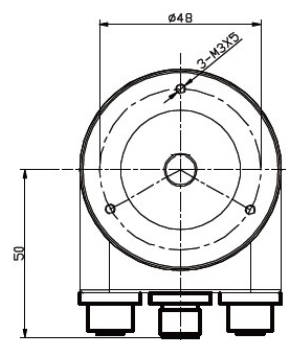
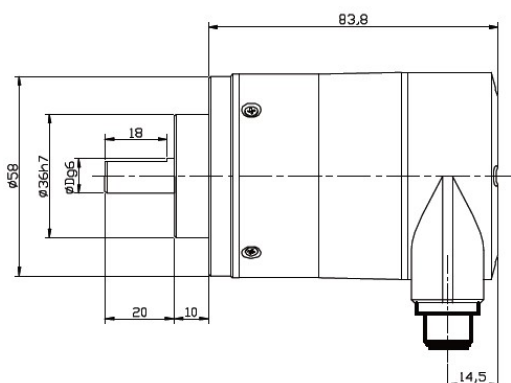
EAM58W



EAM58B



EAM58C



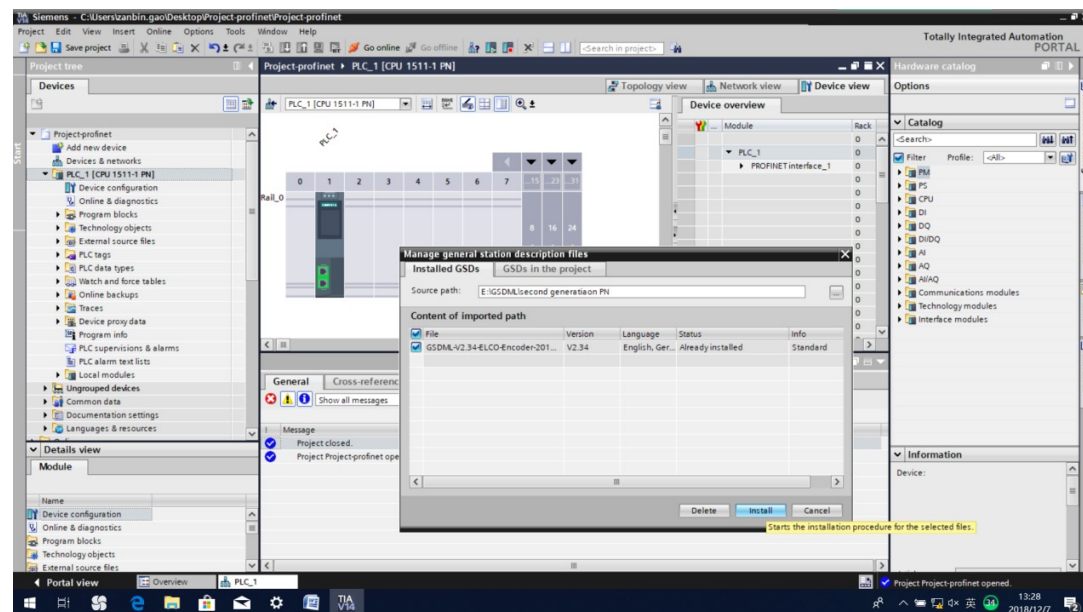
## 4. Using examples

### 4.1 Install Encoder GSDML File

In this section, according to the TIA Portal V14 software, click "Manage General Station Description Files" in the "Options" drop-down menu of the software to open the dialog box, find the path of the GSDML file in the source path, and select the GSDML file in the content of imported path, click the "Install" button. as follows:

**GSD File: GSDML-V2.34-ELCO-Encoder-20200702.xml**

**GSDML-002A-0008-ELC\_DAP1.bmp**



### 4.2 Encoder configuration

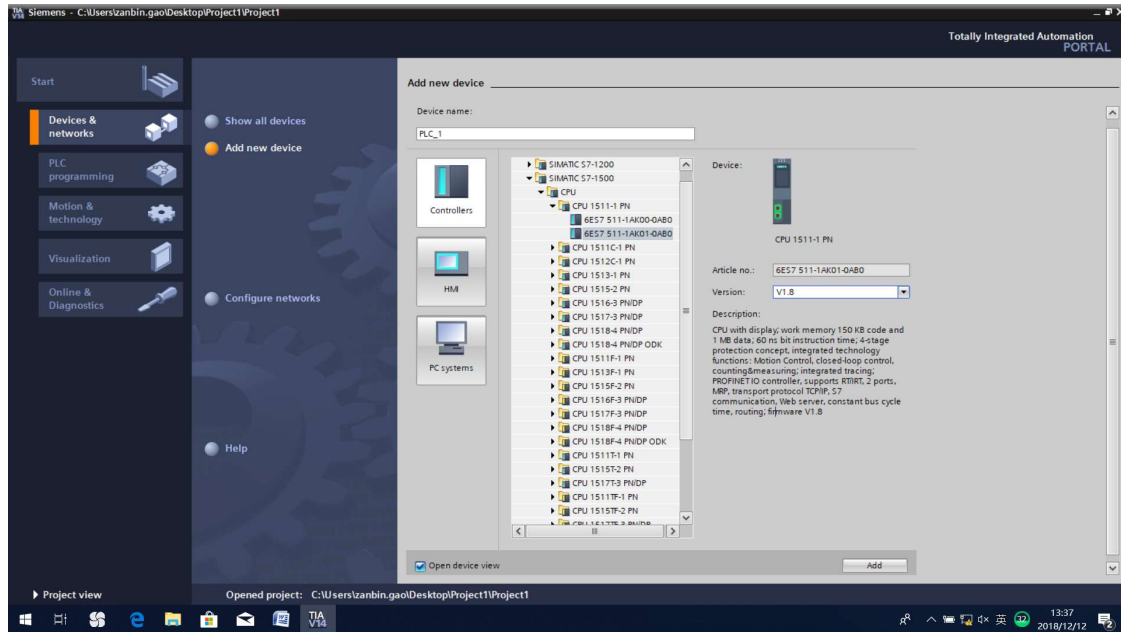
This section provides the user with a comprehensive understanding of the actual use of the Profinet encoder through a practical demonstration of the configuration and connection. In this example, the ELCO Profinet encoder is used as the Profinet IO slave to connect to the Siemens S7-1500 PLC, and the configuration and debugging are performed using the TIA Portal V14 software on the PC. The specific software configuration and debugging process will be illustrated via images.

#### 1) Device connection

The Port 1 or Port 2 of the Profinet encoder is connected to a network port of the Siemens S7-1500 PLC using a standard Profinet cable. The remaining port of the S7-1500 PLC is connected to the PC running the TIA Portal V14 software. Ensure that the power cables for both the encoder and the PLC module are connected to a DC +24V power supply.

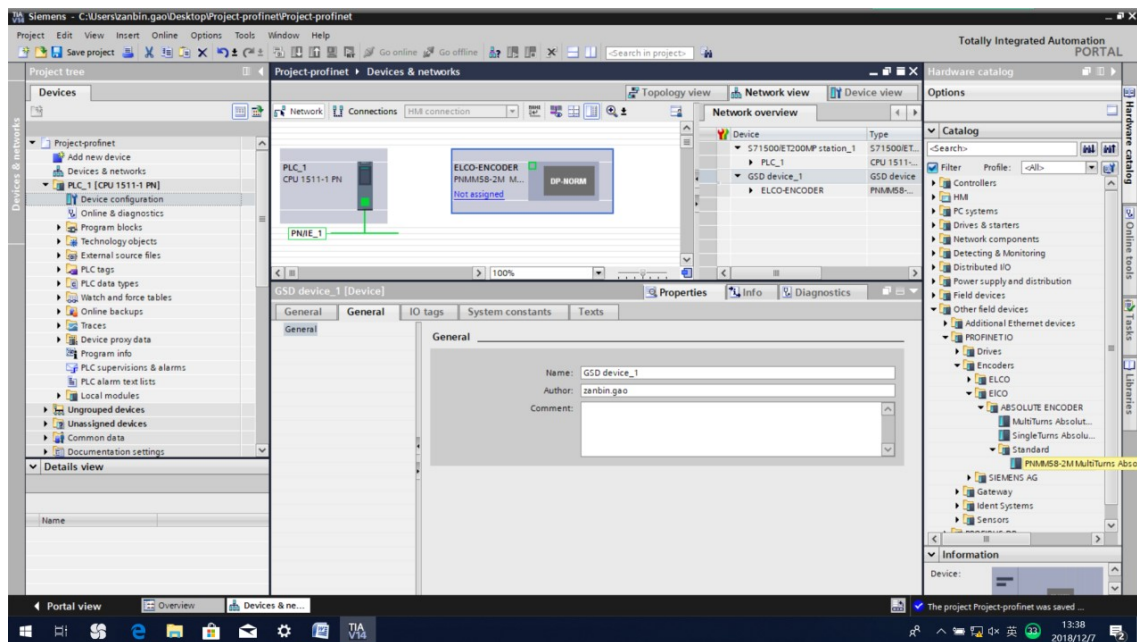
#### 2) Add new equipment

Double-click "Add New Device" in the "Project" menu on the left side of the TIA Portal V14 software to select the PLC with the same model and version, and click the "Add" button. as follows:



In the "Other Field Devices" of the "Hardware Catalog" menu which is on the right side of the TIA Portal V14 software, find the name of the encoder device you want to add and drag it into the network view. as follows:

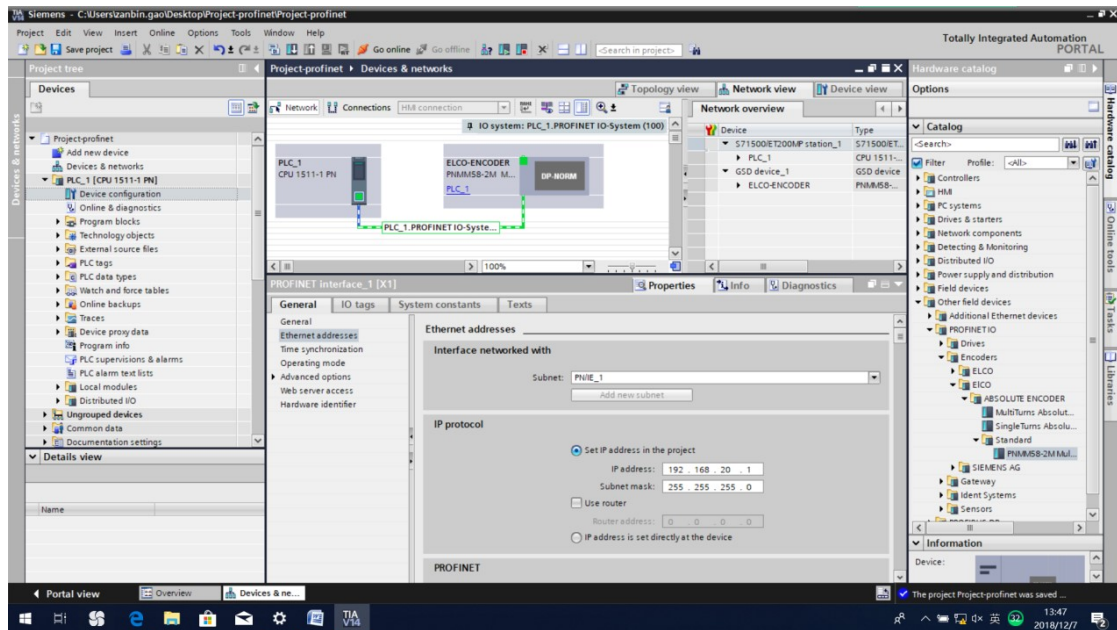
**Note:** Select PNMM58-4M Multi-turn absolute encoder



### 3) Configuration settings

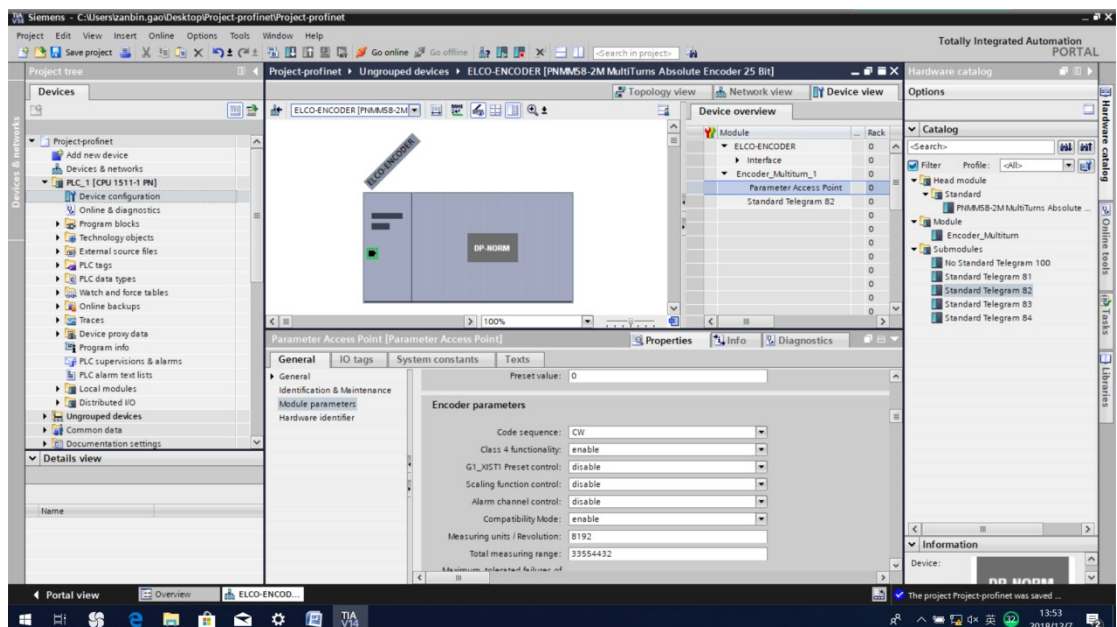
Click the "Unallocated" button on the encoder device block and click "PLC\_1 PROFINET interface\_1" in the pop-up dialog box. The PLC and the encoder are automatically connected. as follows:





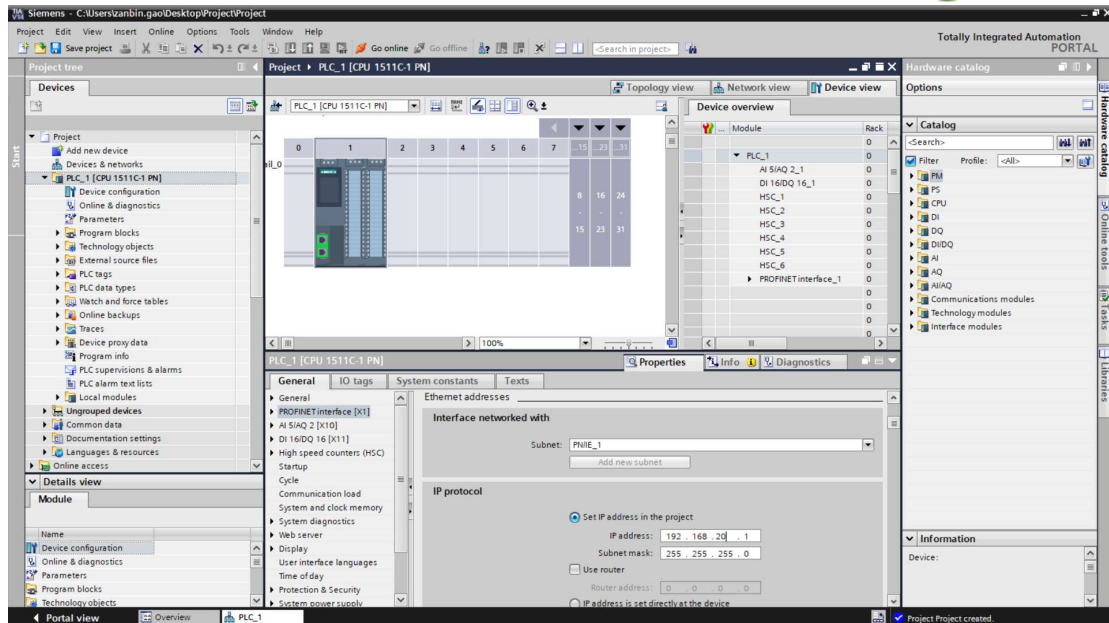
Double-click the encoder device to enter the device view interface. As shown in the following figure, click the drop-down arrow in the hardware catalog on the right side of the software, and then select the required module and drag it to the device overview. The default encoder telegram is Standard Telegram 82. If you want to change to another telegram, please delete the current telegram. Select the required sub-module in the submodules drop-down menu of the hardware catalog, and drag it to the device overview.

Change the default encoder telegram as Standard Telegram 82, as follows:

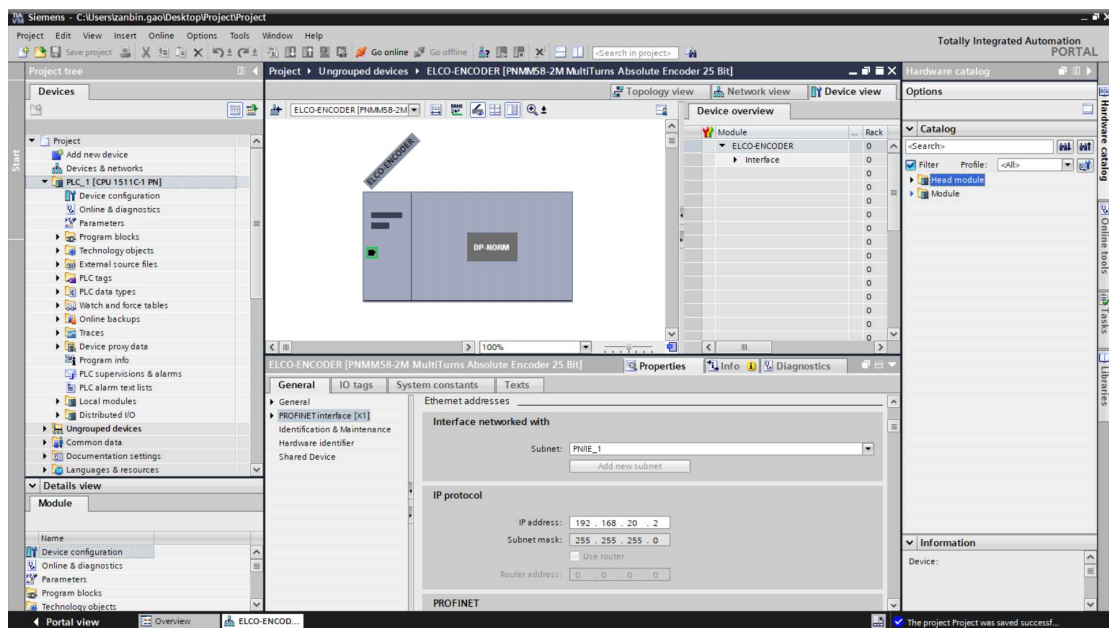


Double-click the PLC and encoder device block to set the IP address and subnet mask in the general dialog box. The IP address of the encoder defaults to 192.168.20.2, ensuring that the PLC, encoder, and PC are in the same LAN.

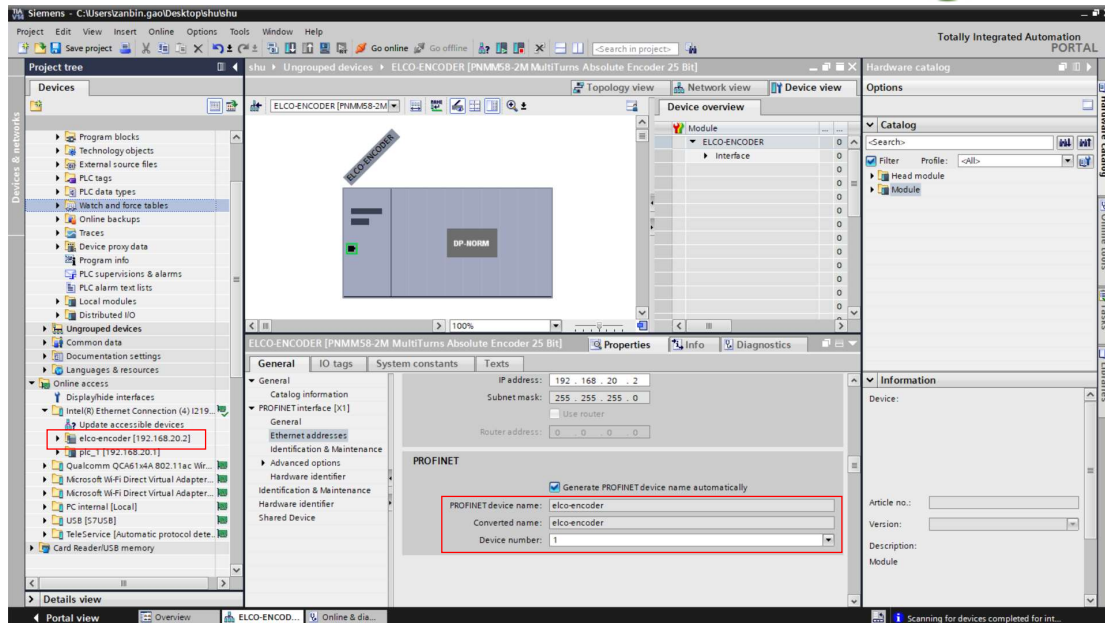
The IP address of the PLC is set as follows:



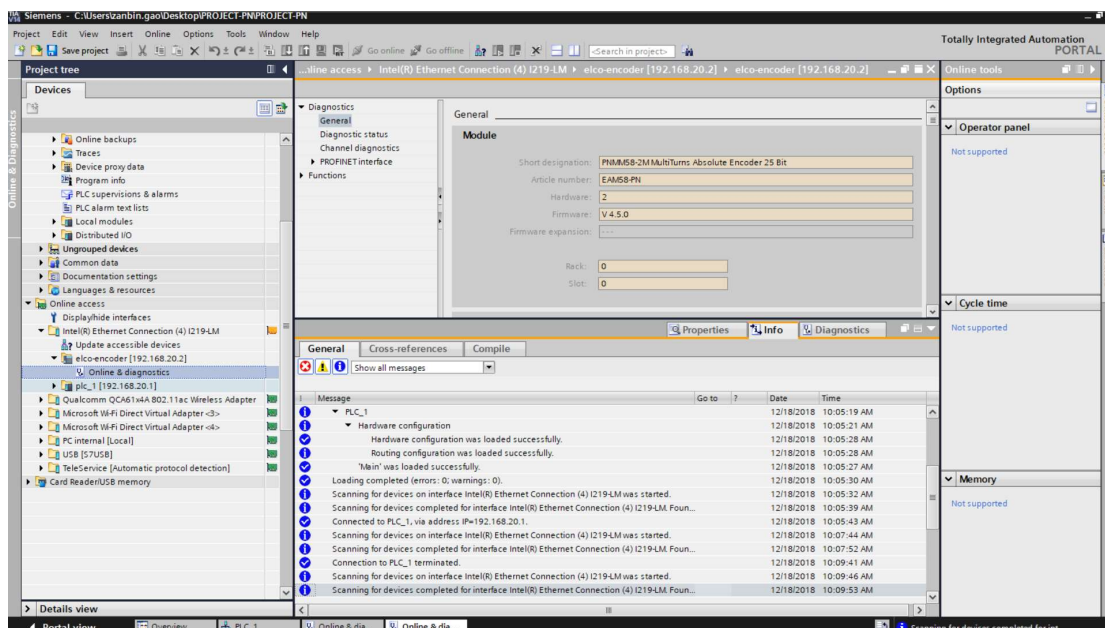
The IP address of the encoder is set as follows:



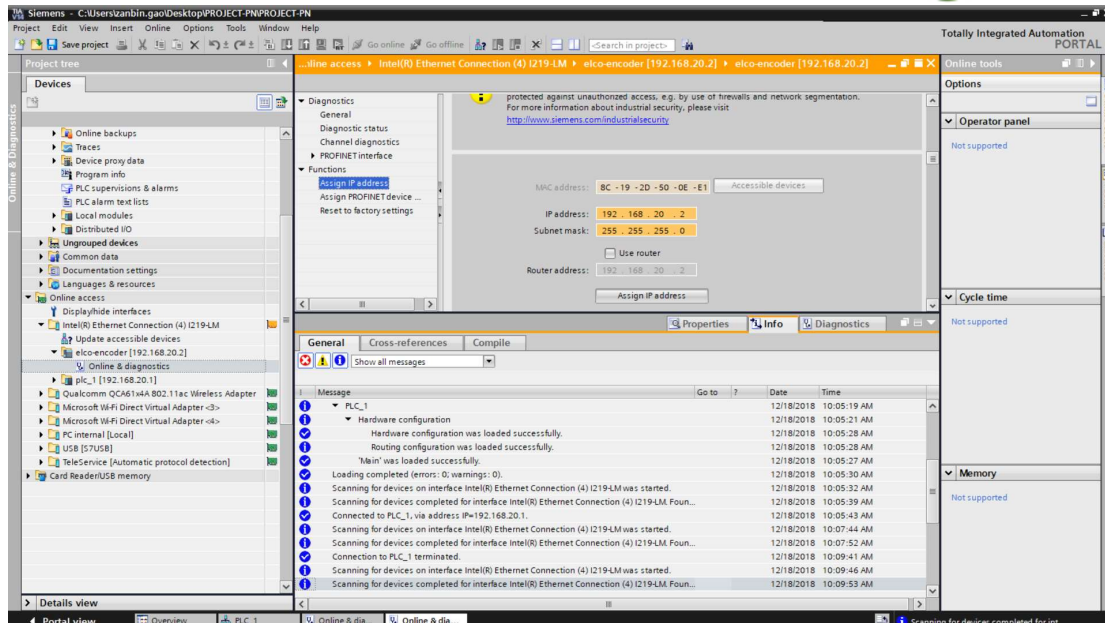
The converted name remains the same as the Profinet device mane



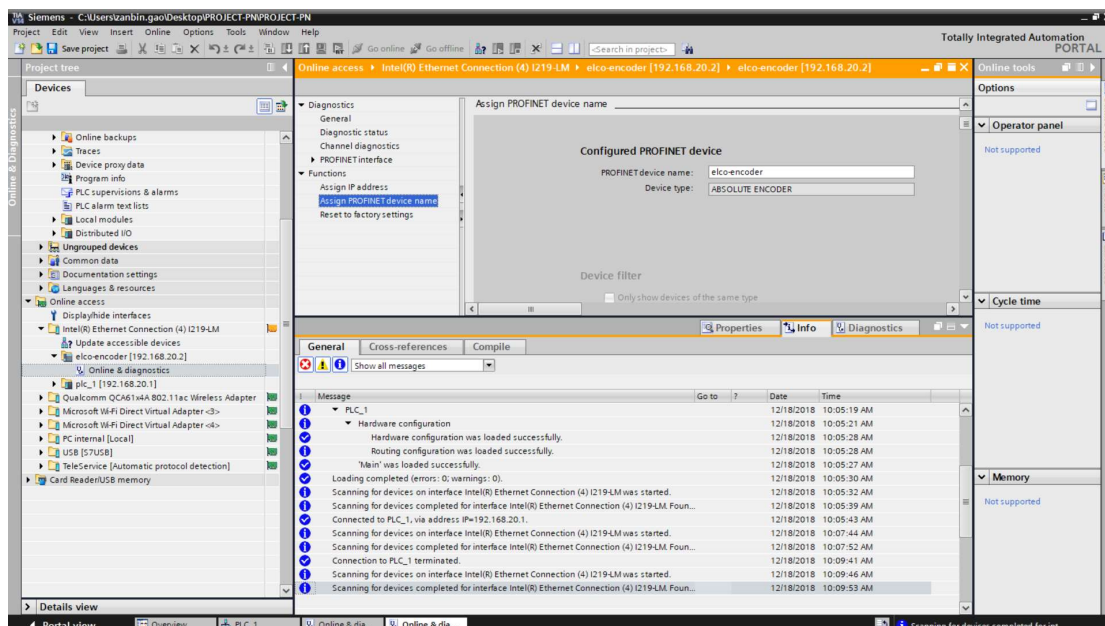
If the names are inconsistent, communication cannot be established. The modification method is as follows. Find the encoder by online access, select "online & diagnostics" in the encoder submenu, and select "Assign IP address" and "Assign PROFINET device name" in Functions.



The IP address is modified as follows:



The PROFINET device name is modified as follows:



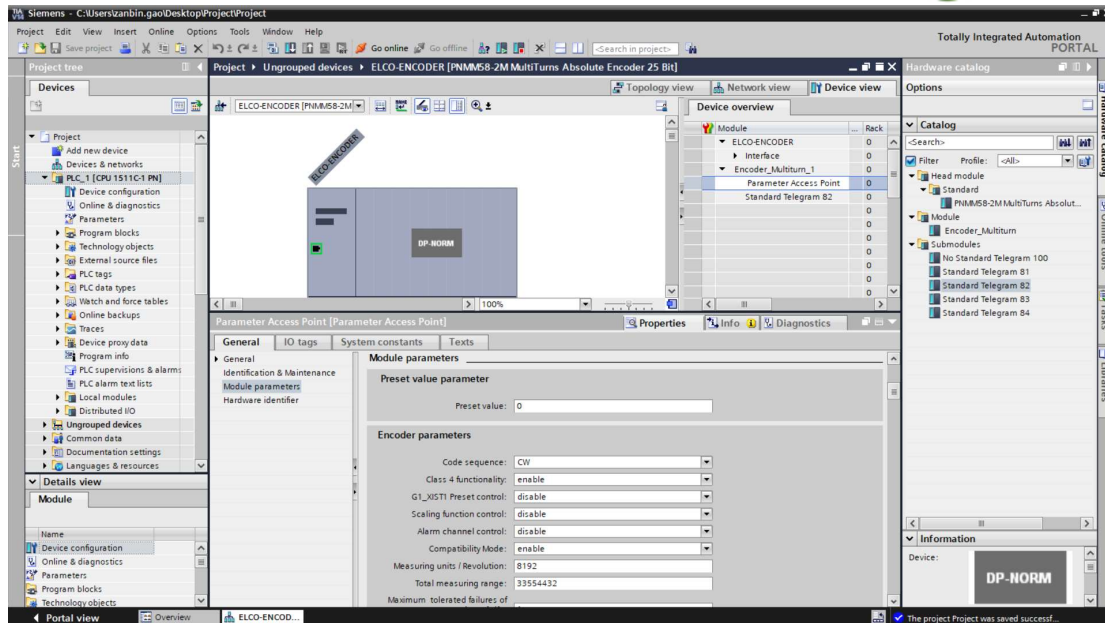
### 4.3 Use of encoder settings

The encoder provides multiple settable items including rotation direction, single-turn resolution, total measuring range, preset value setting, rotation speed, etc.

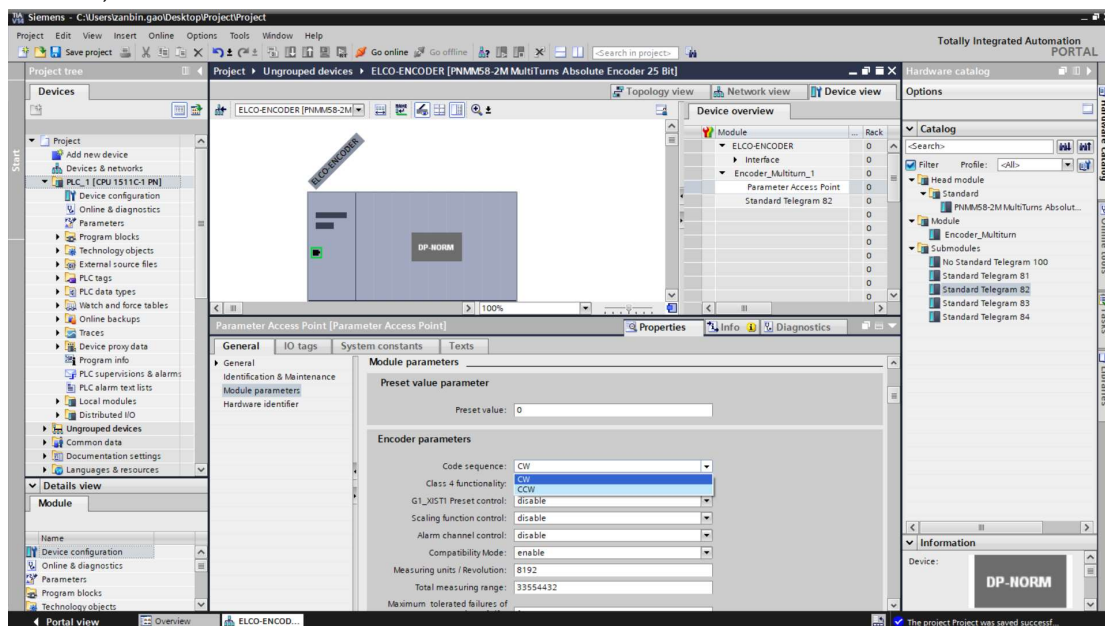
#### 1) Rotation direction setting

Click “Parameter Access Point” in the encoder device overview. Click “Module parameters” in the pop-up dialog box to enter the parameter setting interface. as follows:



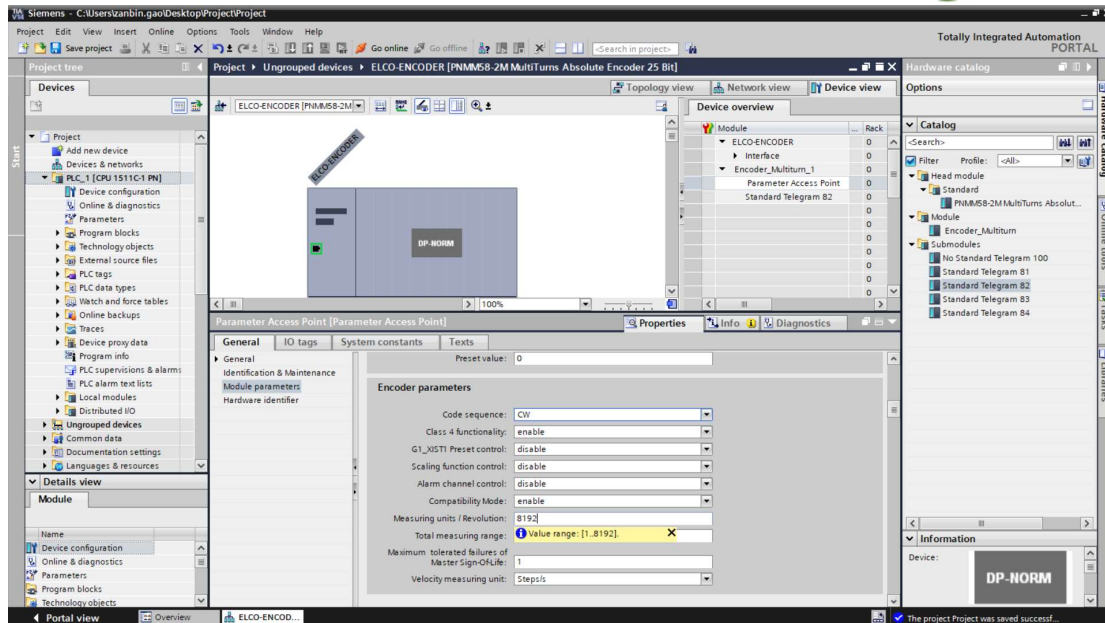


In the Code sequence drop-down menu, select the encoder's forward and reverse, CW: forward, CCW: reverse. as follows:



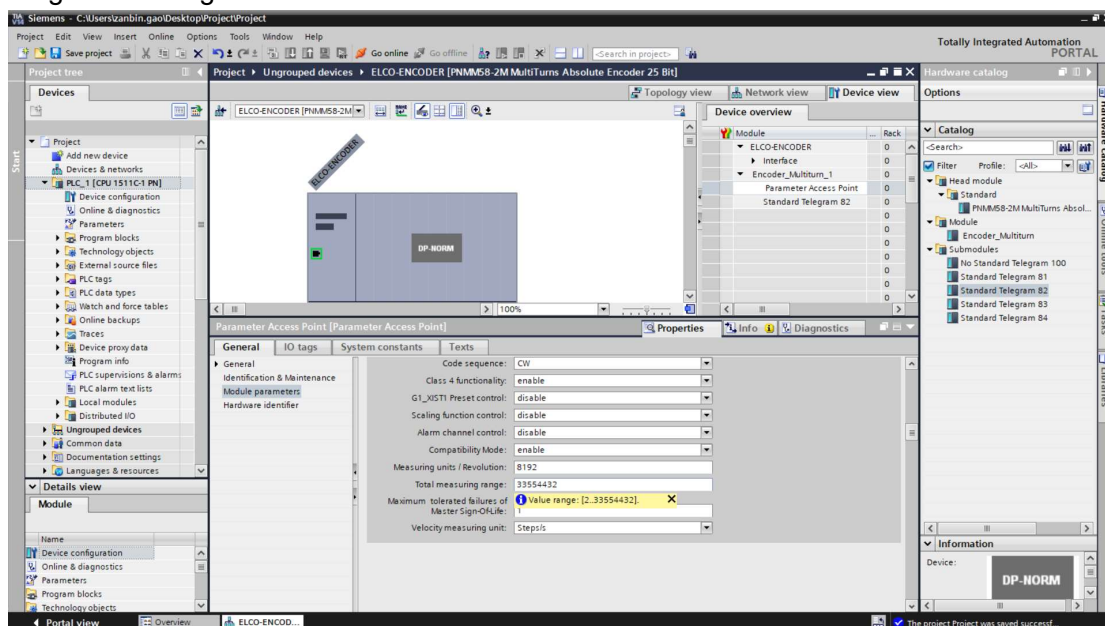
## 2) Single-turn resolution setting

Set the single-turn resolution in the Measuring units / Revolution window, and set the data to an integer ranging from 1 to 8192. as follows:



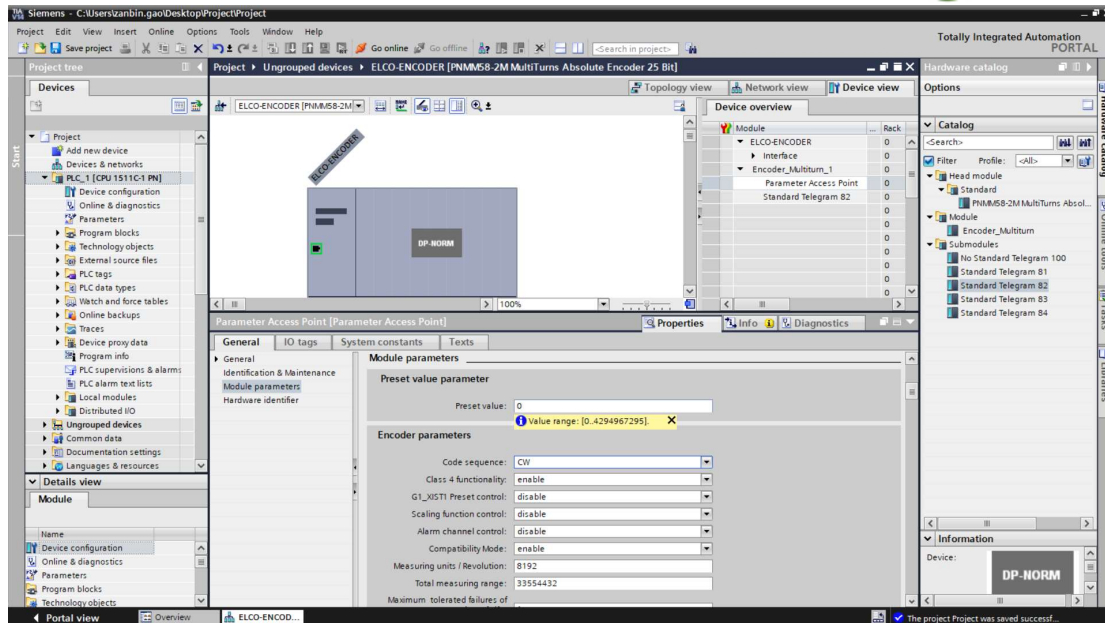
### 3) Total measuring range settings

Set the total measuring value in the window of the Total measuring range. The data setting range is an integer from 1 to 33554432. as follows:



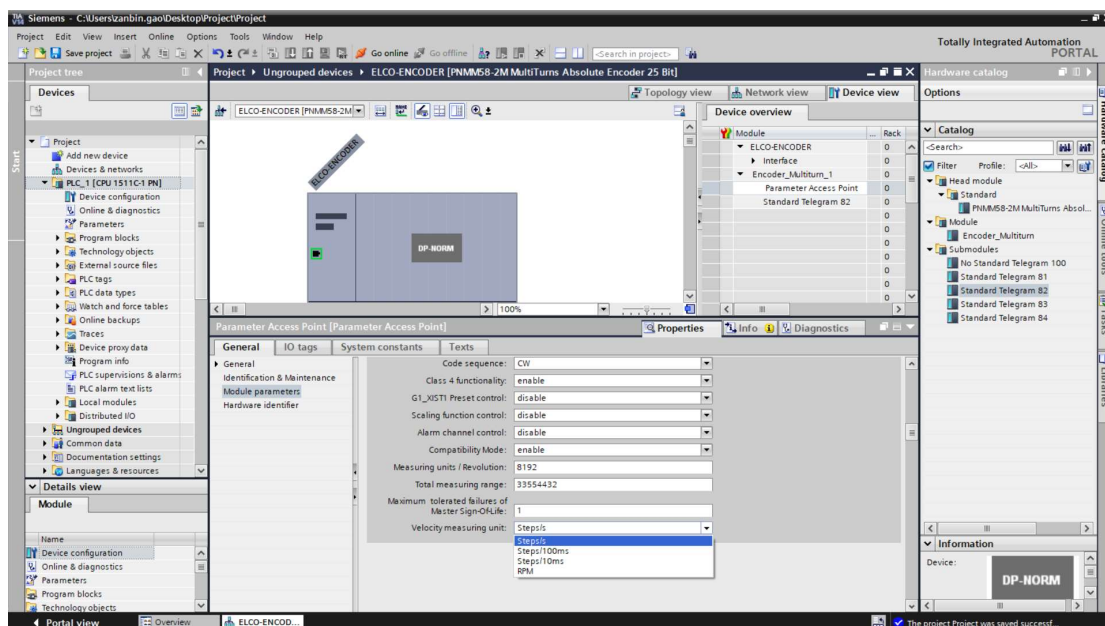
### 4) Preset value setting

Set the preset value in the Preset value window, the data range is an integer from 0-33554431. As follows:



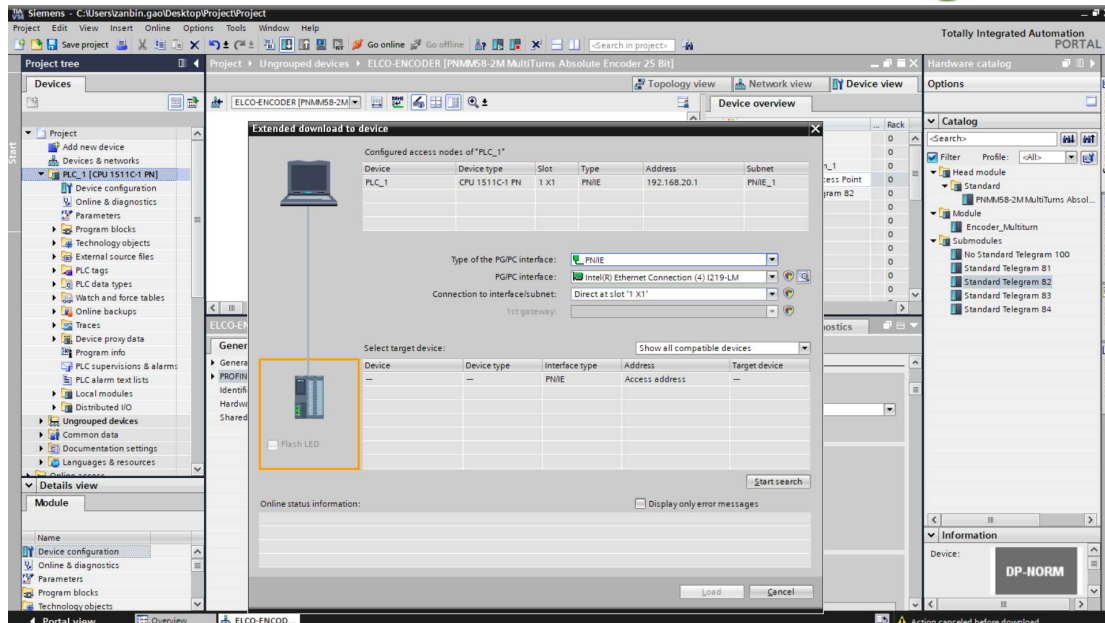
### 5) Speed unit setting

Select the desired speed unit from the drop-down menu of the Velocity measuring unit, as follows:



### 6) Compile and download

Click the “Extended download to device” button on the menu to compile the current configuration and download the compiled program to the corresponding PLC, as follows:



## 4.4 Use of watch and force tables

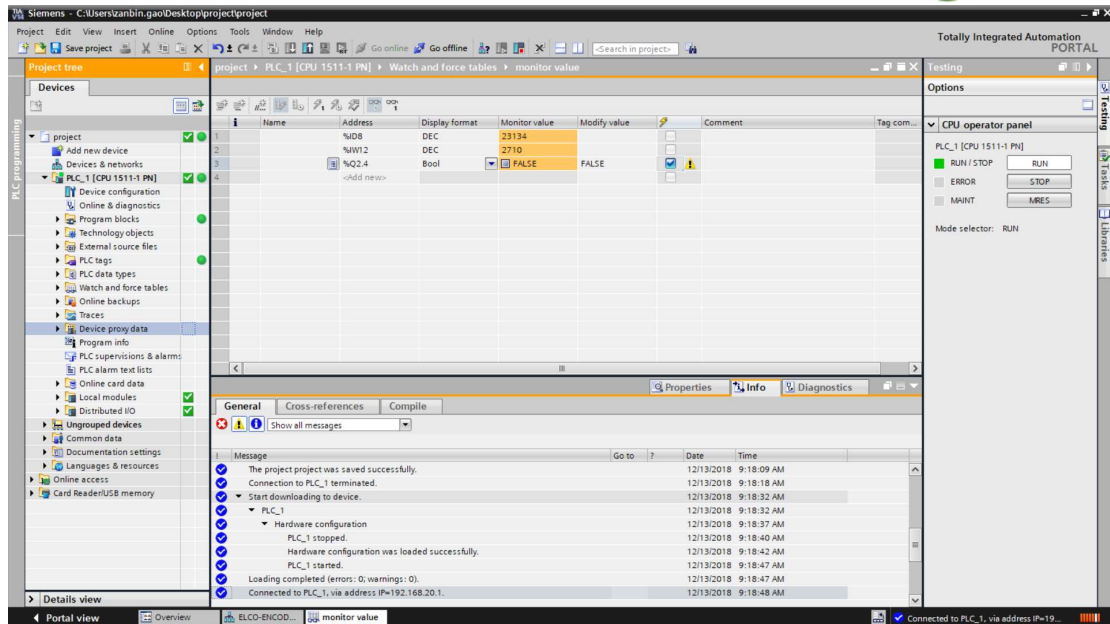
Double-click "Add New Monitoring Table" in the drop-down menu of "Watch and force table" on the left side of TIA Portal V14 software, and set the encoder data input and output address in the pop-up window.

1. When the configuration message is Standard Telegram 81-83 and the default data input address is 0, the real-time position data input address is ID8, the real-time speed input address is IW12, and the preset value setting bit is Q2.4.
2. When the configuration message is Standard Telegram 84 and the default data input address is 0, the real-time position data input address is ID12, there is no real-time speed monitoring function, and the preset value setting bit is Q2.4.
3. If the configuration message is Standard Telegram 100, when the default data input address is 0, the real-time position data input address is ID0, there is no real-time speed monitoring function, the preset value setting bit is Q0.7, the preset value address is QD0, and it does not need to be set in the configuration Preset value.

The currently configured telegram is Standard Telegram 82, so the real-time position data input address is ID8, the real-time speed input address is IW12, and the preset value setting bit is Q2.4.

Real-time position data as follows:



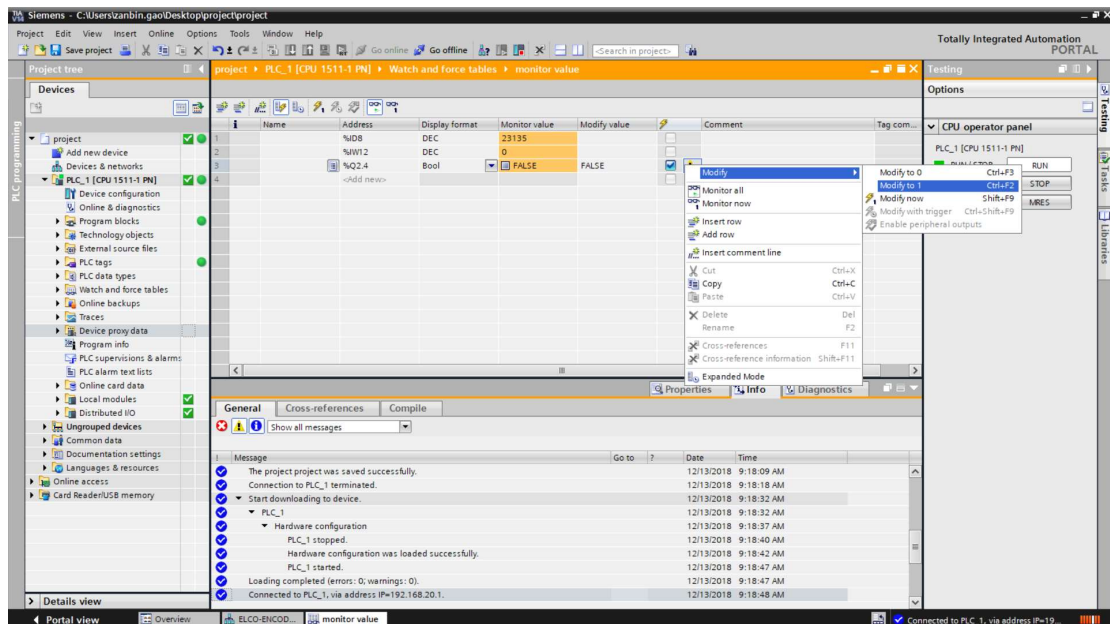


The screenshot shows the Siemens TIA Portal interface. The 'Devices' table is visible, listing the following data:

Name	Address	Display format	Monitor value	Modify value	Comment	Tag com...
1	%I08	DEC	23134			
2	%W12	DEC	2710			
3	%Q2.4	Bool	FALSE	FALSE		
4	-Add new-					

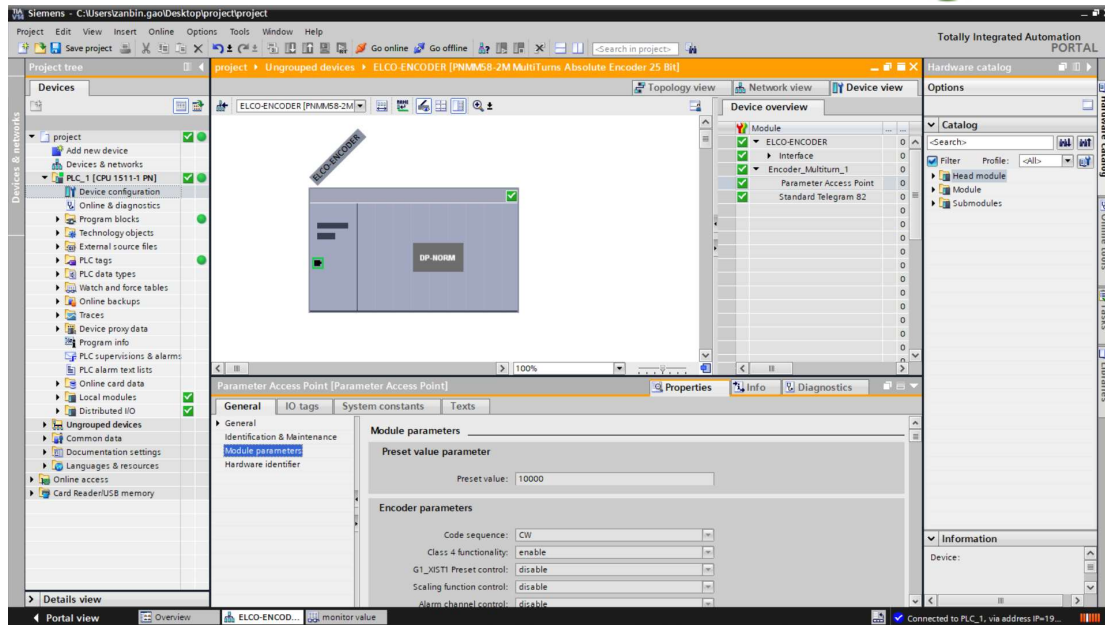
The 'Options' panel on the right shows the 'CPU operator panel' with buttons for RUN, STOP, ERROR, MAINT, and MRES. The 'Mode selector' is set to 'RUN'.

The preset value data is set to ID8 by modifying the setting bit Q2.4 status



The screenshot shows the Siemens TIA Portal interface with a context menu open over the 'Q2.4' status bit. The menu options include: Modify, Monitor all, Monitor now, Insert row, Add row, Insert comment line, Cut, Copy, Paste, Delete, Rename, Cross-references, Cross-reference information, and Expanded Mode. The 'Modify' option is selected, and a sub-menu is visible with options: Modify to 0, Modify to 1, Modify now, Modify with trigger, and Enable peripheral outputs.

Default present value 10000



By modifying the setting bit Q2.4 status, when monitor value displays TURE, the ID8 data is 10000

