Configuring and Parameterizing HART Modules

TIA Portal and SIMATIC PDM

https://support.industry.siemens.com/cs/ww/en/view/109478959

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Contents

1 Introduction

This document describes how to configure HART modules for connecting HART devices in the TIA Portal and parameterize the HART devices with SIMATIC PDM.

Requirements

1. SIMATIC Field PG as Engineering Station with:
   - TIA Portal: In this example we use STEP 7 V13 SP 1 Udp4 (TIA Portal).
   - SIMATIC PDM: In this example we use SIMATIC PDM V8.2 SP1 in "Standalone" mode without STEP 7.
2. PROFINET IO controller:
   CPU 1516-3 PN/DP (article number: 6ES7516-3AN01-0AB0), for example.
3. PROFINET IO device, ET 200SP, for example, consisting of:
   a. IM 155-6 PN HF (article number: 6ES7155-6AU00-0CN0)
   b. AI 4xI 2-wire 4..20mA HART (article number: 6ES7134-6TD00-0CA1)
4. HART device: SITRANS TH300 (article number: 7NG3212-0NN00)

The following figure illustrates the hardware configuration.

Figure 1-1
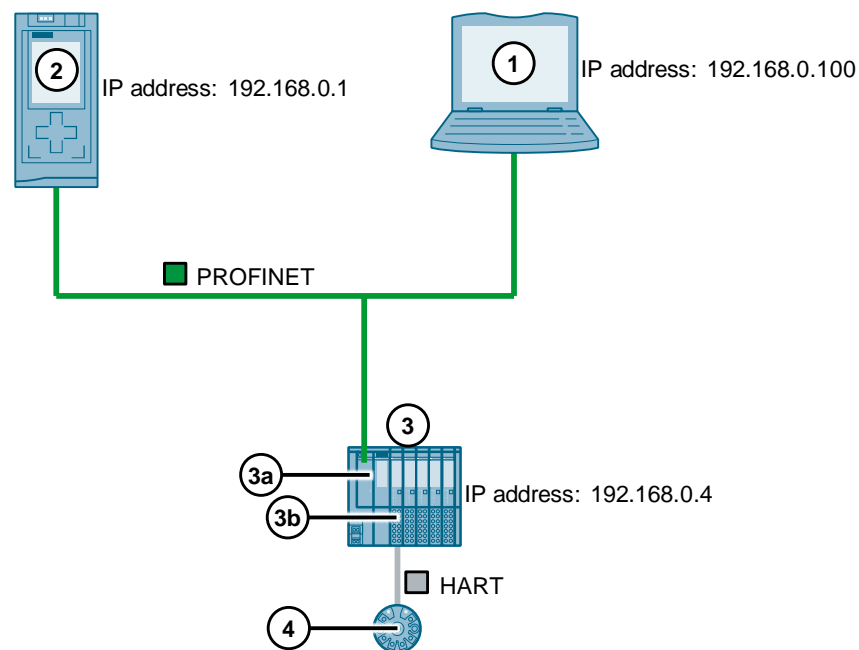
The IP address of the network card of the SIMATIC Field PG is in the same IP subnet as the IP address of the PROFINET IO controller and the PROFINET IO device. Set the following access point under "Set PG/PC Interface":

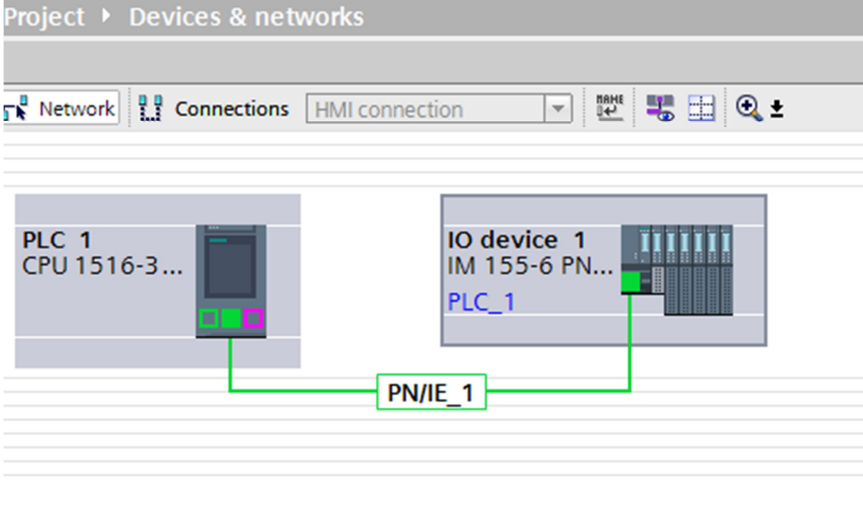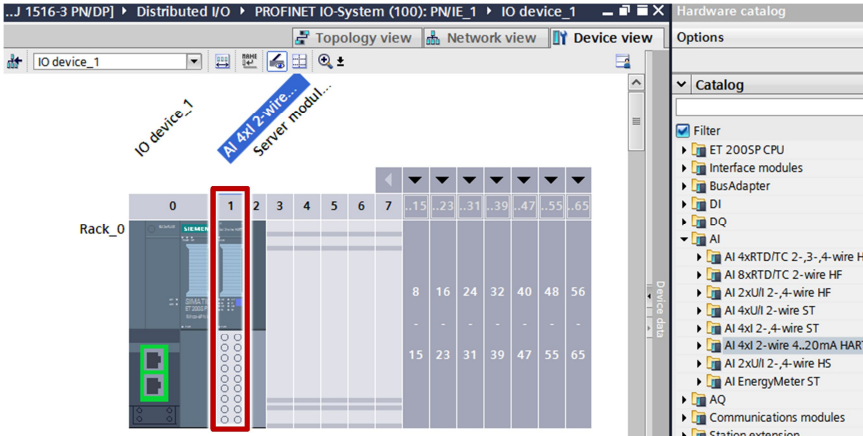S7ONLINE (STEP 7) > Network card.TCPIP

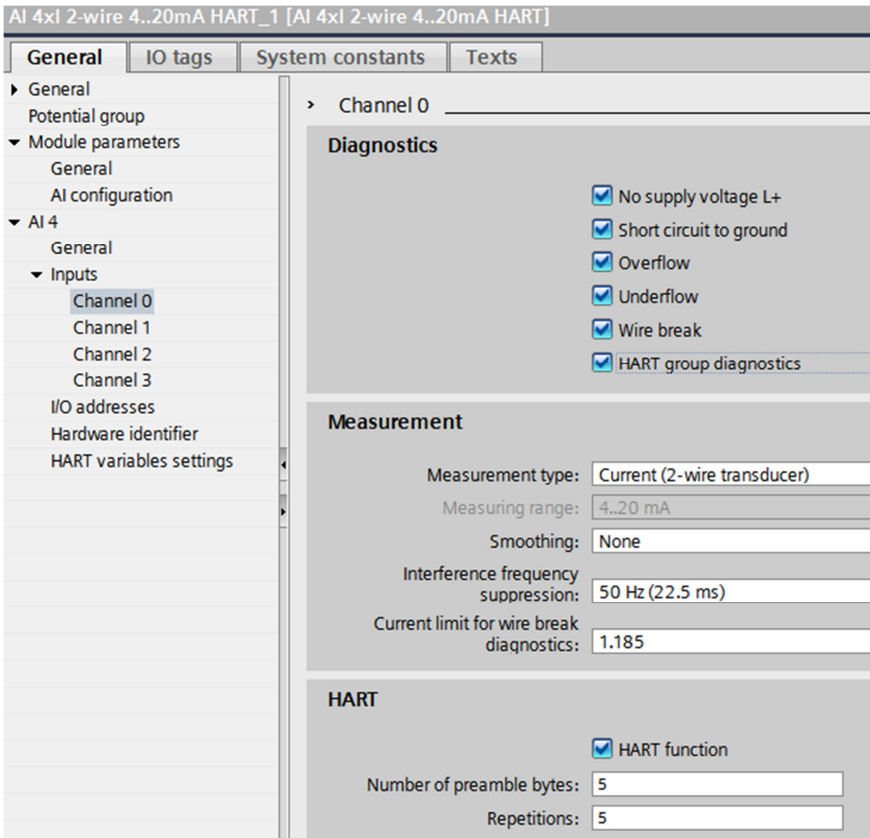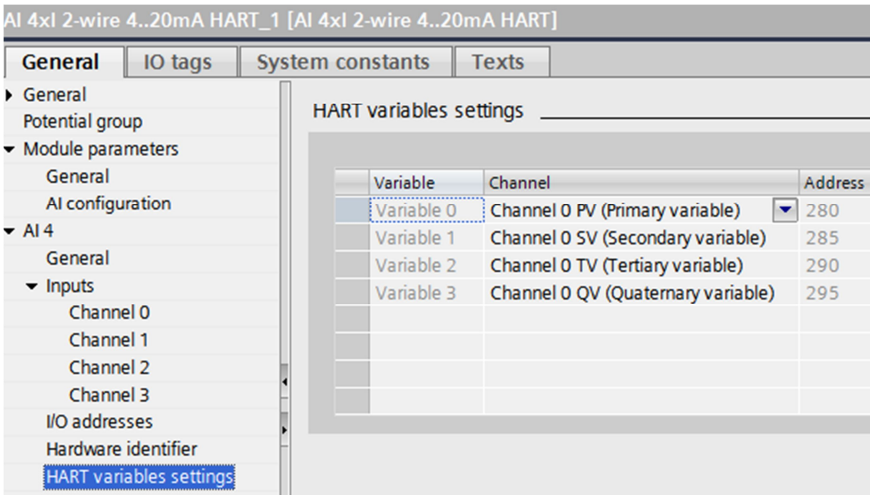| Note	Using a data record gateway, an Engineering Station with SIMATIC PDM can reach field devices several subnets away. The entry below provides information about which modules support the "Data Record Routing" function and which therefore can be used as a data record gateway. https://support.industry.siemens.com/cs/ww/en/view/7000978

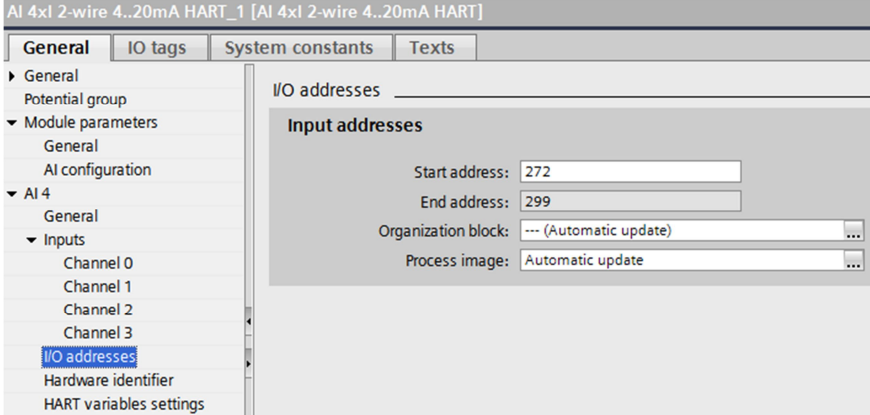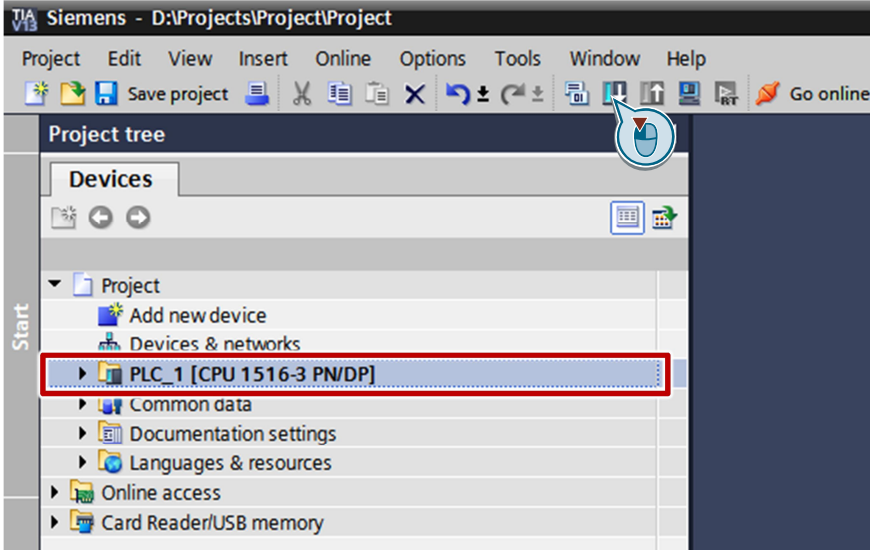# 2 Configuring the HART Module in the TIA Portal

This chapter shows how to configure the HART module in the TIA Portal.

Table 2-1

No.	Description
1.	Open the TIA Portal and create a new project.
2.	Add a new S7 CPU, for example CPU 1516-3 PN/DP.
3.	As PROFINET IO device you configure the ET 200SP consisting of the modules below: • Interface module: IM 155-6 HF • Analog input module: AI 4xI 2-wire 4..20mA HART
4.	In the Device View of the ET 200SP you mark the HART module AI 4xI 2-wire 4..20mA HART. The properties of the HART module are displayed in the inspector window.

No.	Description
5.	In the "General" tab you navigate to "AI 4 > Inputs > Channel 0". For channel 0, to which the HART device SITRANS TH300 is connected, you enable diagnostics, set the parameters for measuring and enable the HART function. **AI 4xI 2-wire 4..20mA HART_1 [AI 4xI 2-wire 4..20mA HART]** **General** IO tags System constants Texts ▸ General Potential group ▾ Module parameters 　General 　AI configuration ▾ AI 4 　General 　▾ Inputs 　　Channel 0 　　Channel 1 　　Channel 2 　　Channel 3 　I/O addresses 　Hardware identifier 　HART variables settings › Channel 0 **Diagnostics** ☑ No supply voltage L+ ☑ Short circuit to ground ☑ Overflow ☑ Underflow ☑ Wire break ☑ HART group diagnostics **Measurement** Measurement type: Current (2-wire transducer) Measuring range: 4..20 mA Smoothing: None Interference frequency suppression: 50 Hz (22.5 ms) Current limit for wire break diagnostics: 1.185 **HART** ☑ HART function Number of preamble bytes: 5 Repetitions: 5
6.	Go to the "General" tab and navigate to "AI 4 > HART variables settings". Select the relevant primary, secondary, tertiary and quaternary variables of the HART device. Up to 4 HART variables can be shown on the process image. Detailed information about the HART variables is available in the manual of the module AI 4xI 2-wire 4..20mA HART, in the section entitled HART variables. **AI 4xI 2-wire 4..20mA HART_1 [AI 4xI 2-wire 4..20mA HART]** **General** IO tags System constants Texts ▸ General Potential group ▾ Module parameters 　General 　AI configuration ▾ AI 4 　General 　▾ Inputs 　　Channel 0 　　Channel 1 　　Channel 2 　　Channel 3 　I/O addresses 　Hardware identifier 　HART variables settings HART variables settings | Variable	Channel	Address
---	---	---
Variable 0	Channel 0 PV (Primary variable)	280
Variable 1	Channel 0 SV (Secondary variable)	285
Variable 2	Channel 0 TV (Tertiary variable)	290
Variable 3	Channel 0 QV (Quaternary variable)	295	

No.	Description
7.	Go to the "General" tab and navigate to "AI 4 > I/O addresses". Here you can change the start address of the input addresses of the module "AI 4xI 4..20mA HART" if it is outside the process image of the CPU, for example.
8.	In the project tree you mark the device folder of the S7-CPU. In the toolbar you click the "Download to device" button to download the configuration and user program into the S7-CPU.

3 Configuring and Parameterizing the HART Device with SIMATIC PDM
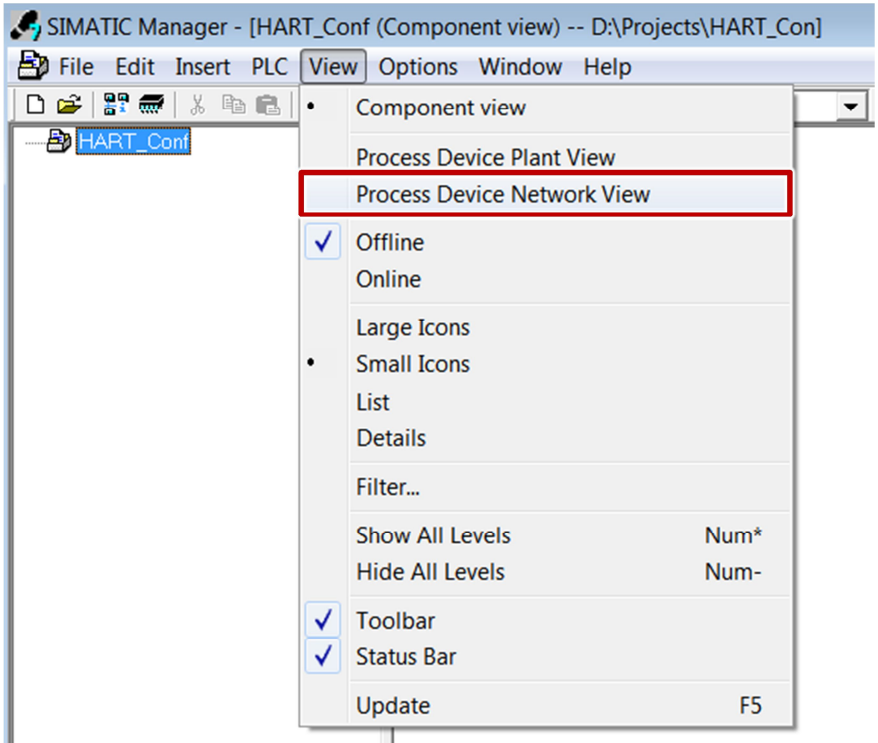
This chapter shows:
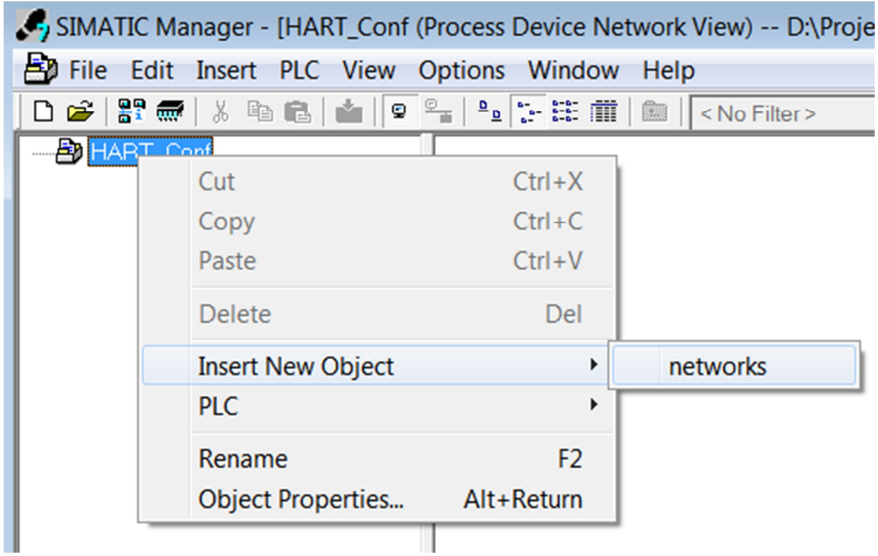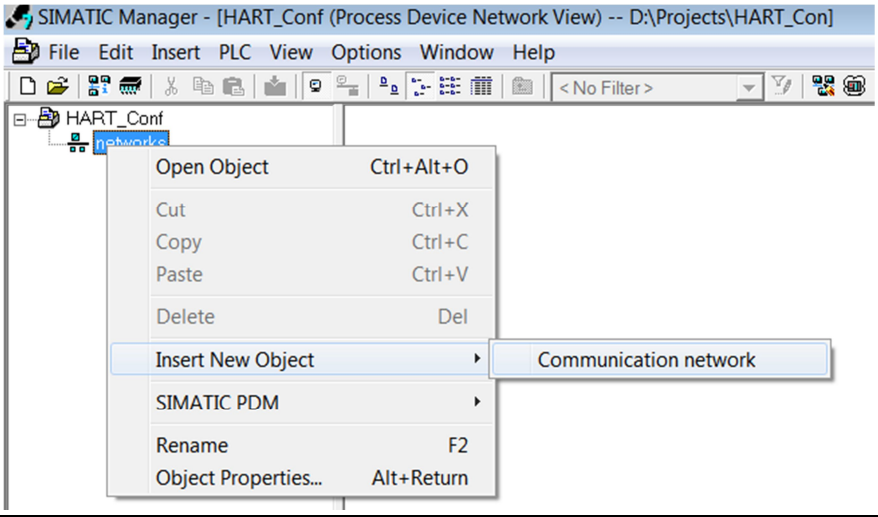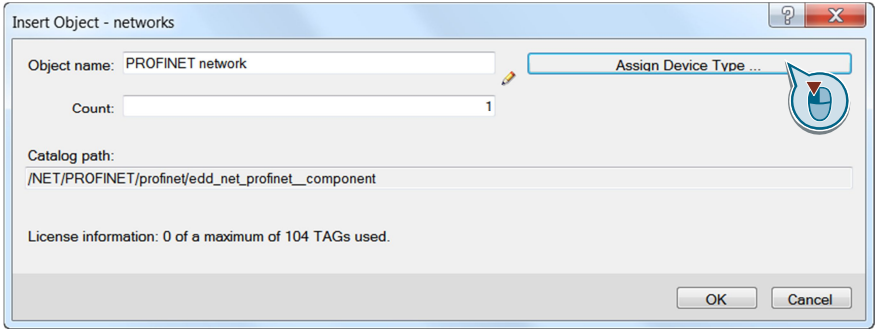
- The configuration of the HART device (SITRANS TH300) in the SIMATIC Manager.

- The parameterization of the HART device in SIMATIC PDM.
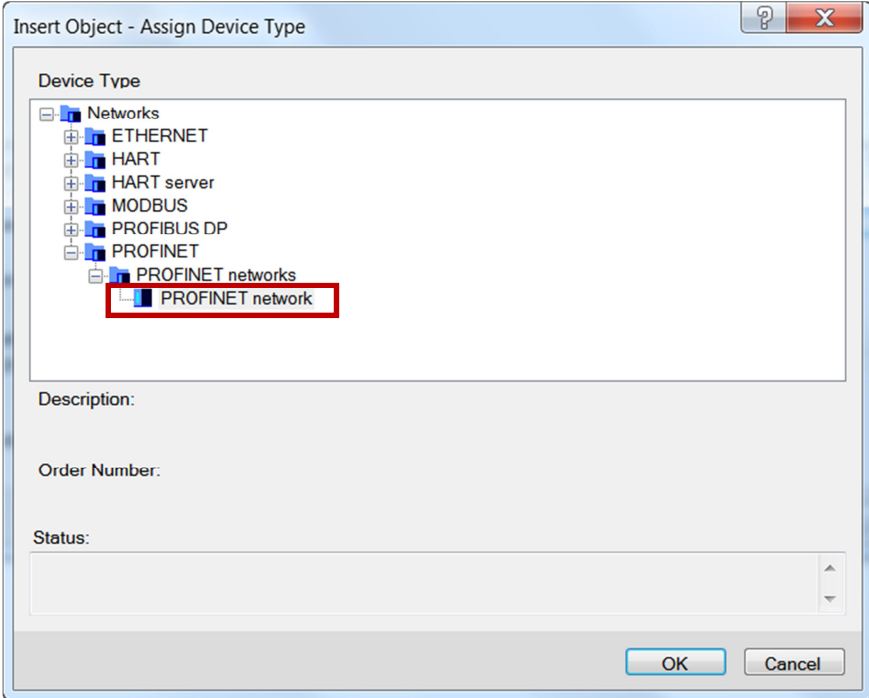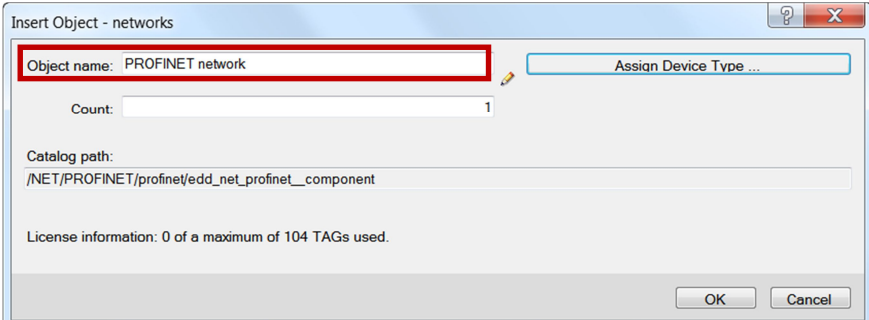
3.1 Configuration of the HART Device in the SIMATIC Manager
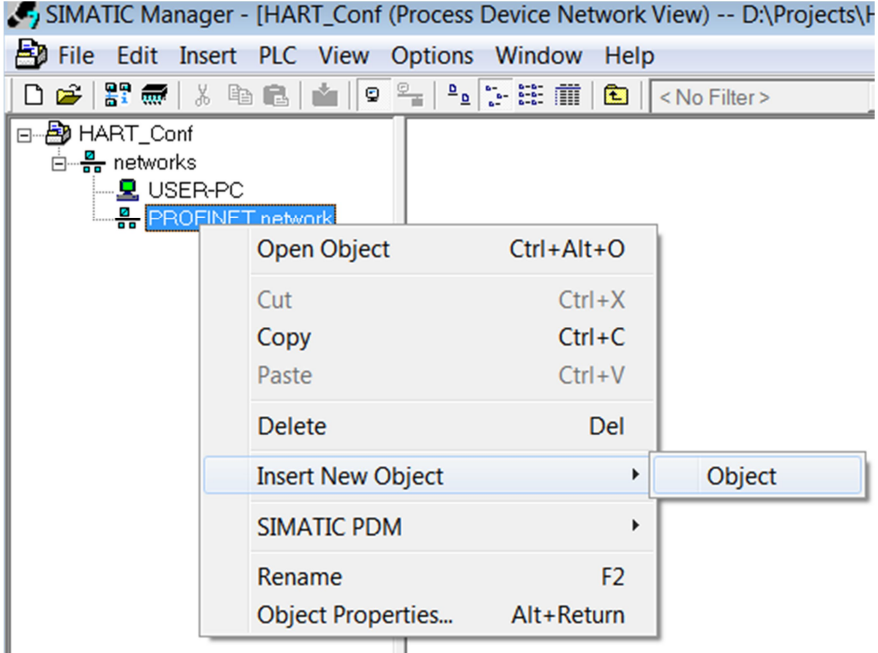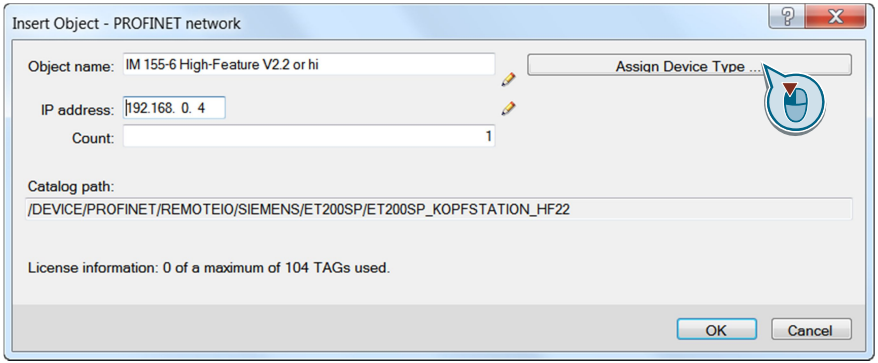
Proceed as follows to configure the HART device in the SIMATIC Manager.
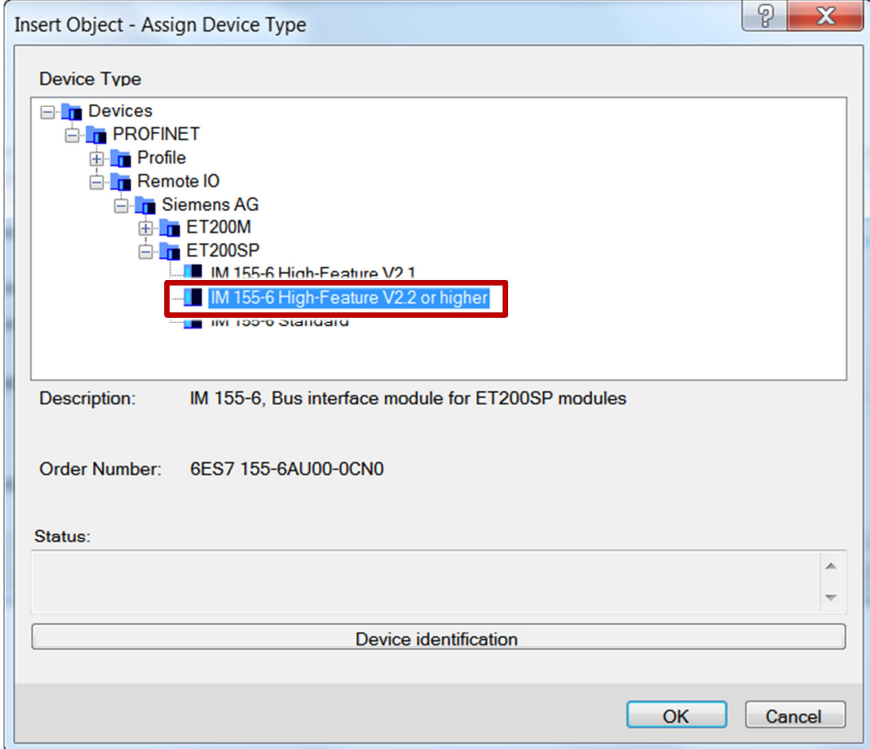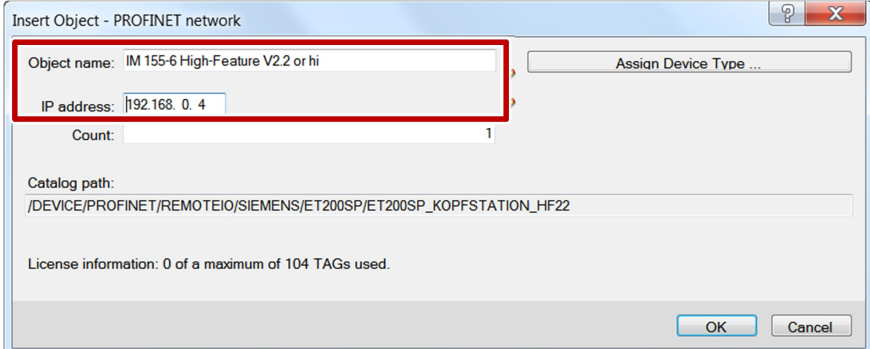
Table 3-1

No.	Description
1.	Open the SIMATIC Manager. This is supplied with SIMATIC PDM and is installed when you install SIMATIC PDM.
2.	Create a new project in the SIMATIC Manager.
3.	In the SIMATIC Manager you open the Process Device Network View via the menu "View > Process Device Network View".
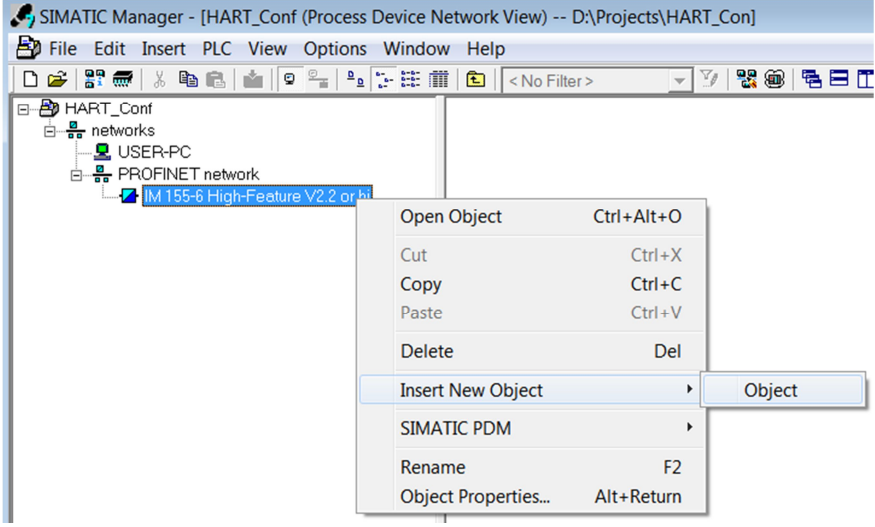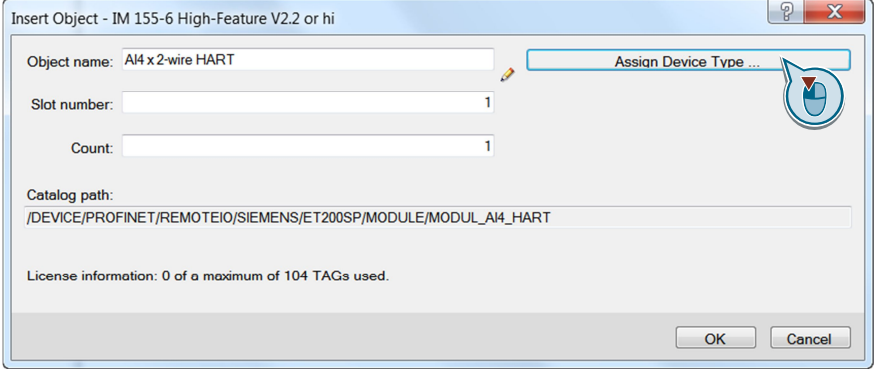
No.	Description
4.	In the Process Device Network View you right-click the project name. Via the pop-menu "Insert New Object > Networks" you insert the object "Networks".
5.	Right-click the "Networks" object. Via the pop-menu "Insert New Object > Communication Networks" you open the dialog "Insert Object – networks".
6.	Click the "Assign Device Type" button. The "Insert Object – Assign Device Type" dialog opens.
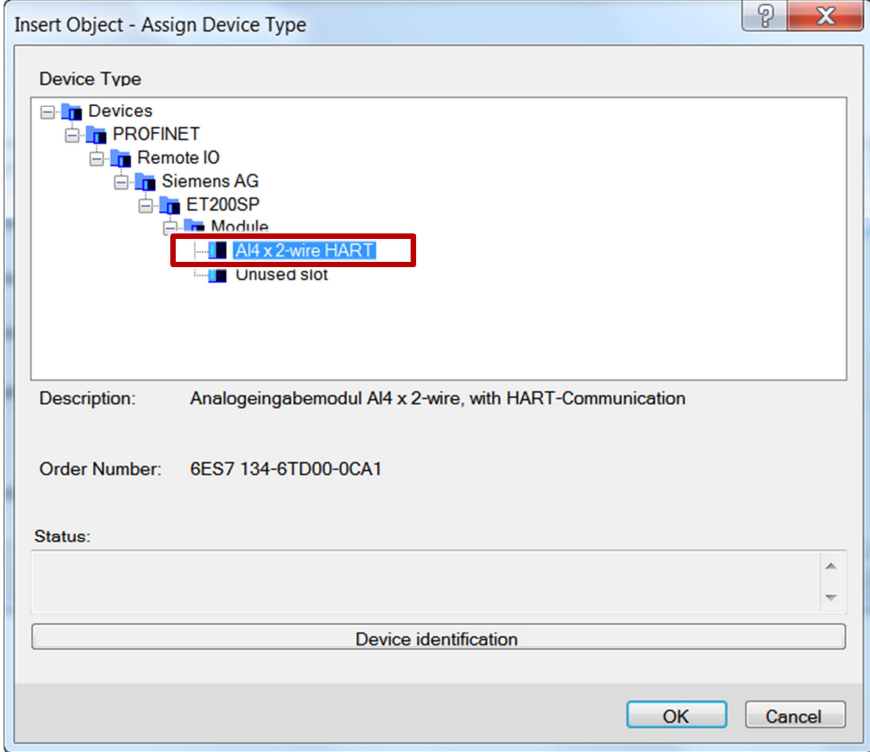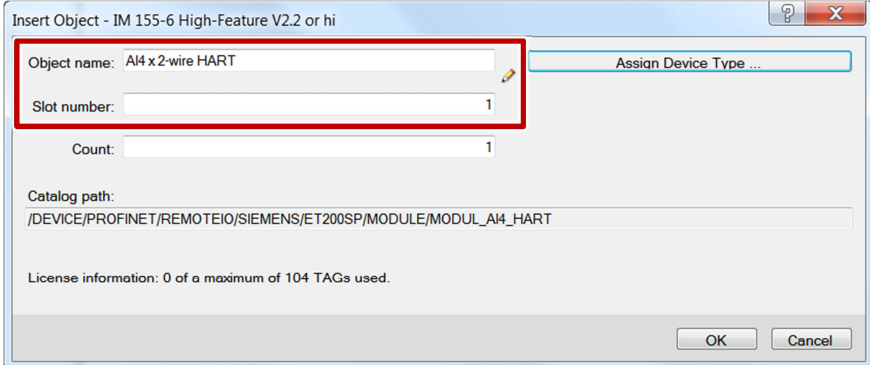
No.	Description
7.	Under "Networks > PROFINET > PROFINET networks" you select the PROFINET network. Click "OK" to close the dialog.
8.	The object name "PROFINET network" is displayed in the "Insert Object – networks" dialog. Click "OK" to close the dialog.
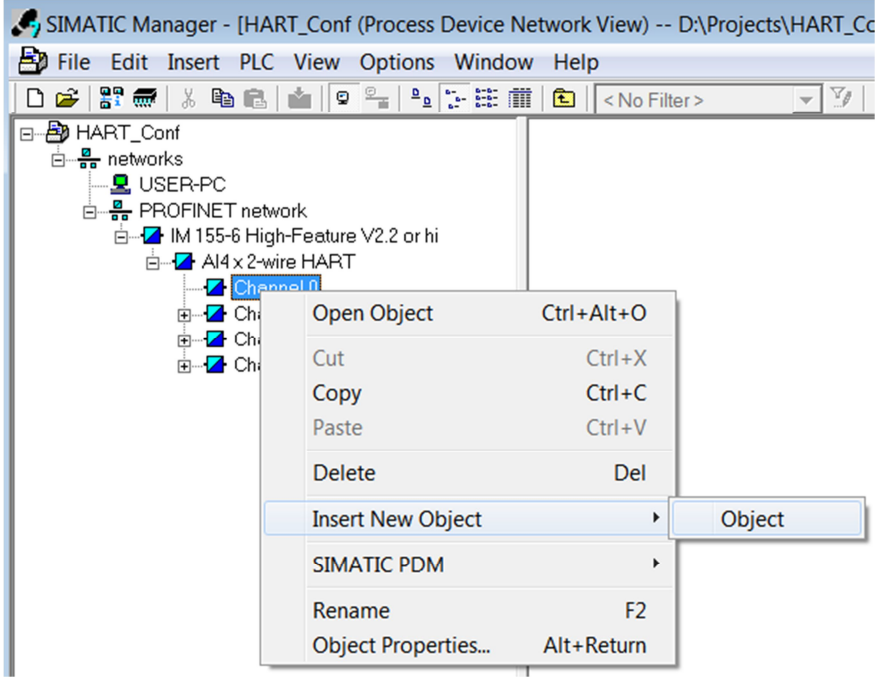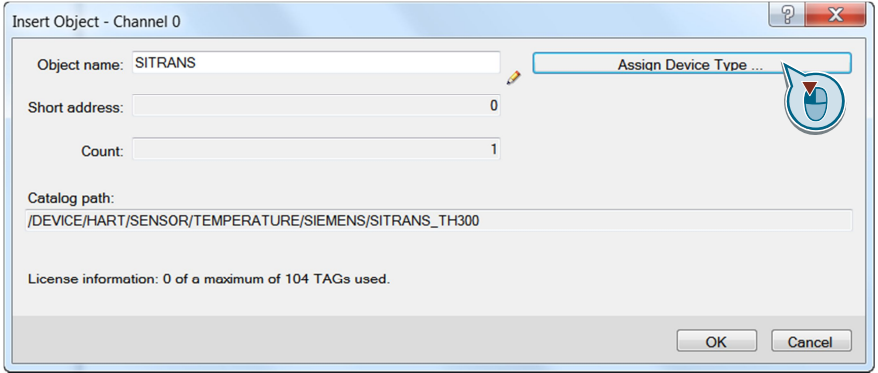
No.	Description
9.	Right-click the "PROFINET network" object. Via the pop-menu "Insert New Object > Object" you open the dialog "Insert Object – PROFINET network".
10.	Click the "Assign Device Type" button. The "Insert Object – Assign Device Type" dialog opens.

No.	Description
11.	Under "Devices > PROFINET > Remote IO > Siemens AG > ET 200SP" you select the relevant interface module. In this example we use an IM 155-6 High-Feature V2.2 or higher. Click "OK" to close the dialog.
12.	The object name "IM 155-6 High-Feature V2.2 or higher" is displayed in the dialog "Insert Object – PROFINET network". Enter the IP address 192.168.0.4 of the IM 155-6 PN HF. Click "OK" to close the dialog.
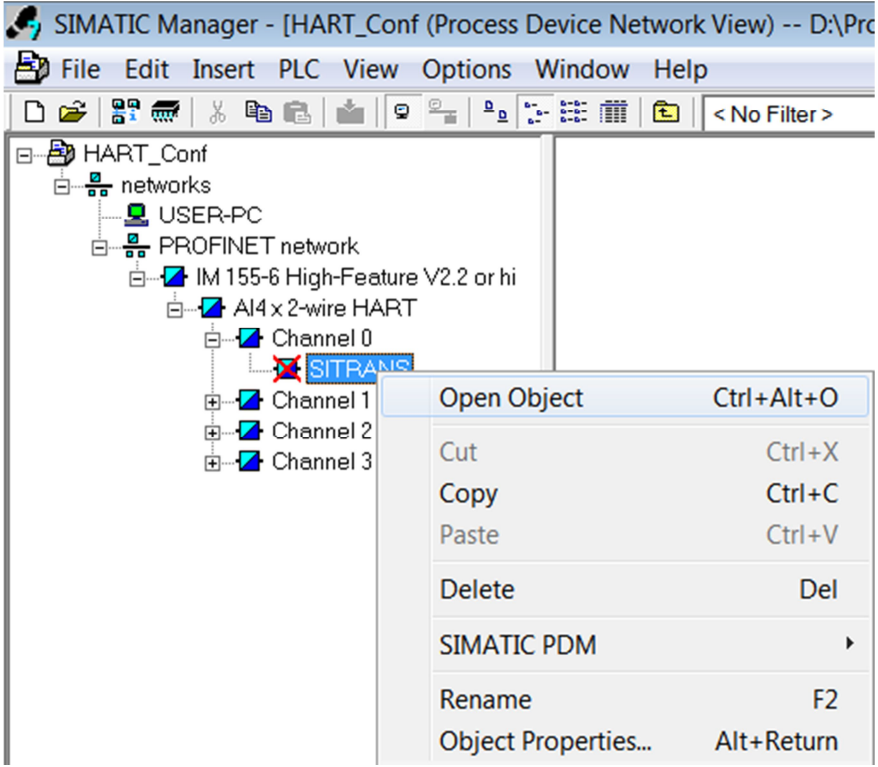
No.	Description
13.	Right-click the object "IM 155-6 High-Feature V2.2 or higher". Via the pop-menu "Insert New Object > Object" you open the dialog "Insert Object – IM 155-6 High-Feature V2.2 or higher".
14.	Click the "Assign Device Type" button. The "Insert Object – Assign Device Type" dialog opens.

No.	Description
15.	Under "Devices > PROFINET > Remote IO > Siemens AG > ET 200SP > Module" you select the HART module. In this example we use an AI4 x 2-wire HART. Click "OK" to close the dialog.
16.	The object name "AI4 x 2-wire HART" is displayed in the dialog "Insert Object – IM 155-6 High-Feature V2.2 or higher". The slot must match the slot of the module in the TIA Portal. Click "OK" to close the dialog.

No.	Description
17.	Right-click the object "Channel 0" of the HART module AI4 2-wire HART. Via the pop-menu "Insert New Object > Object" you open the dialog "Insert Object – Channel 0".
18.	Click the "Assign Device Type" button. The "Insert Object – Assign Device Type" dialog opens.

No.	Description
19.	Select the HART device. In this example we us a SITRANS TH300. This HART device is located under "Sensors > Temperature > Siemens AG". Click "OK" to close the dialog. **Requirements** • The library entitled "PDM_Device_Library" must be installed. • The device description of the HART device must be integrated in the "Device Integration Manager" tool.
20.	The object name "SITRANS" is displayed in the "Insert Object – Channel 0" dialog. Click "OK" to close the dialog.
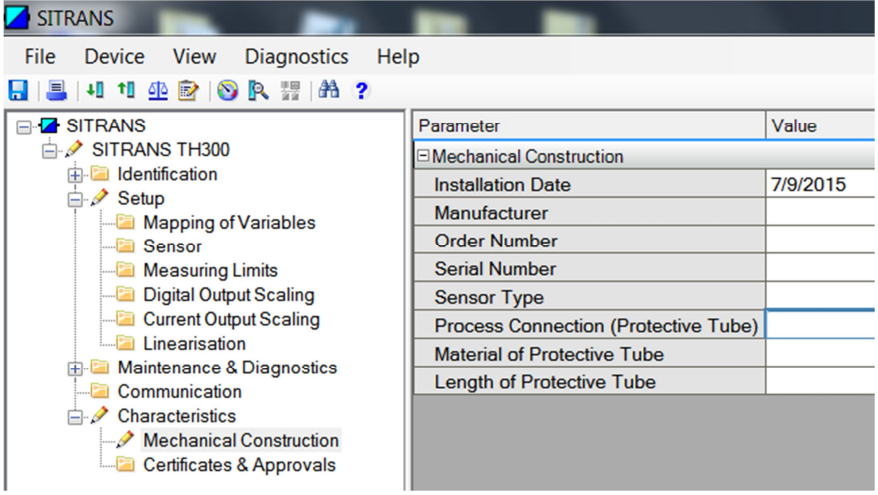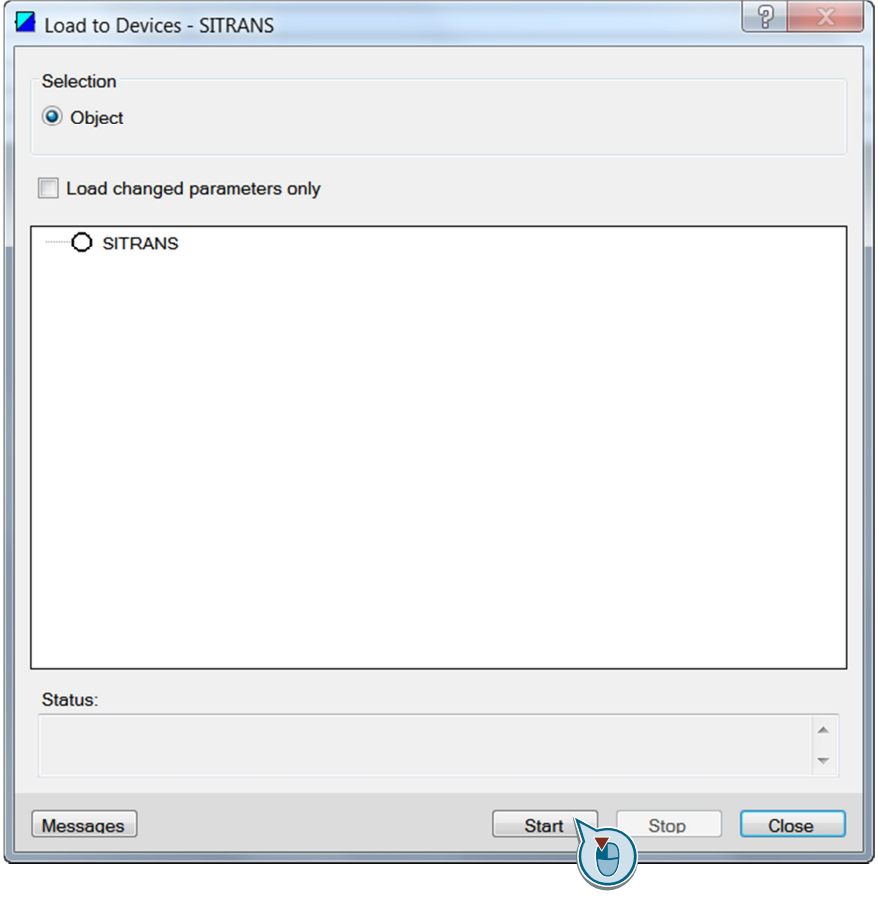
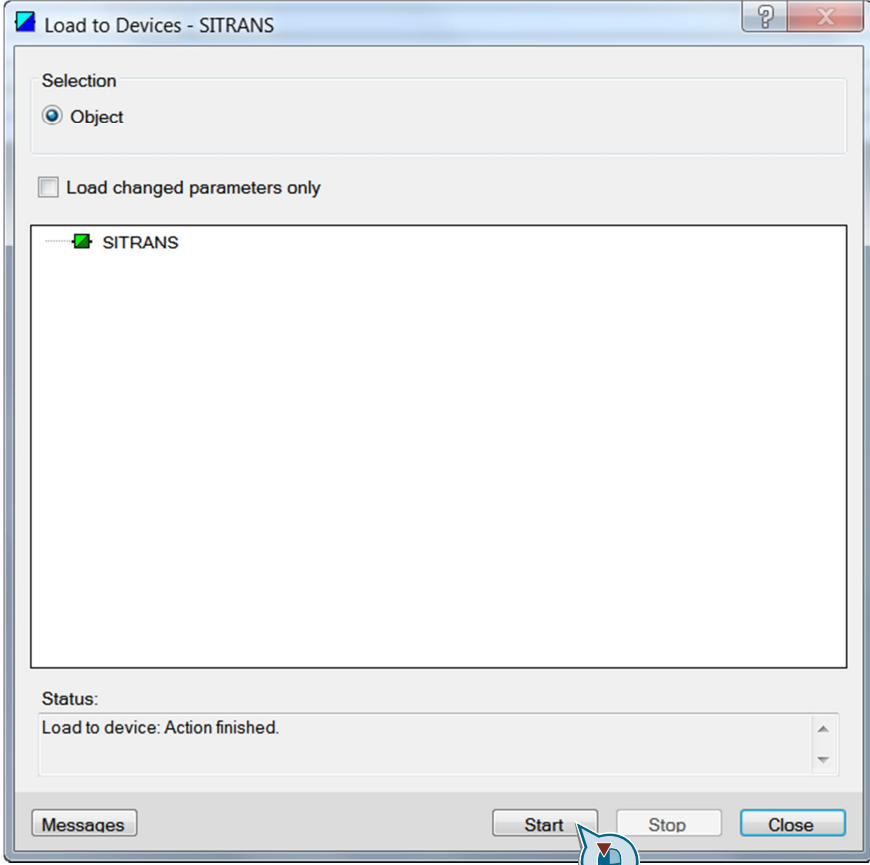| No.	Description
21.	Right-click the "SITRANS" object. In the pop-up menu you select "Open object". SIMATIC PDM opens.

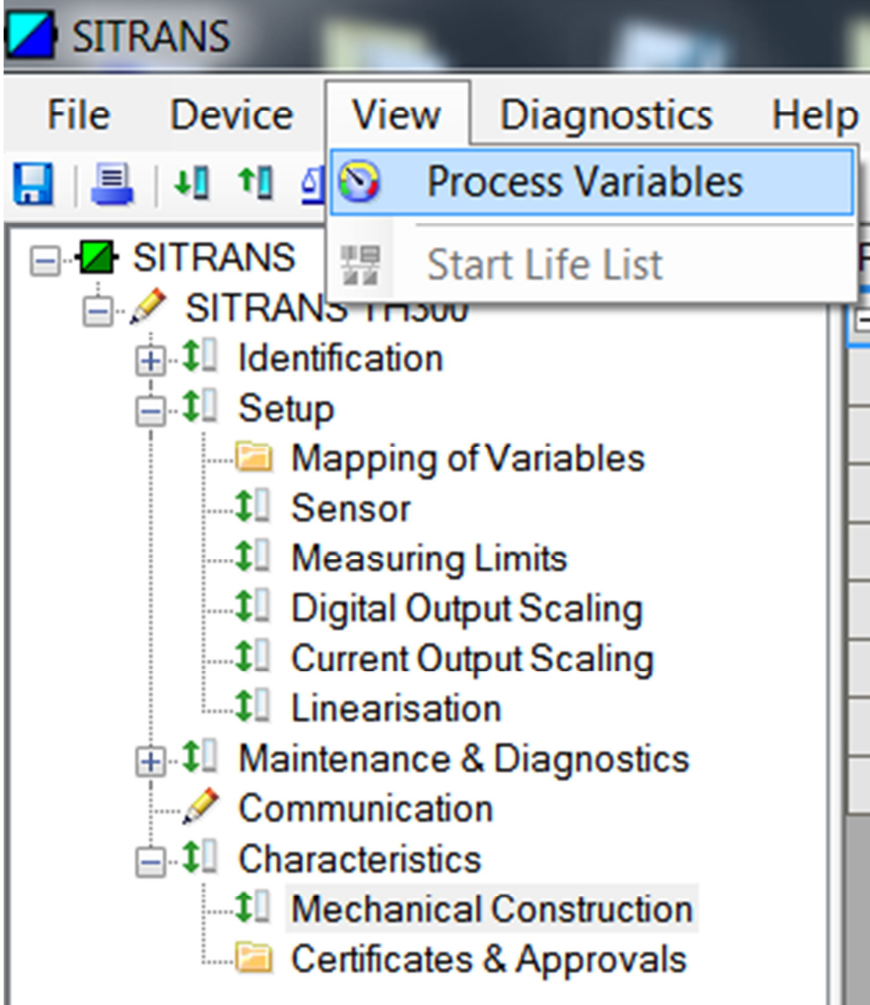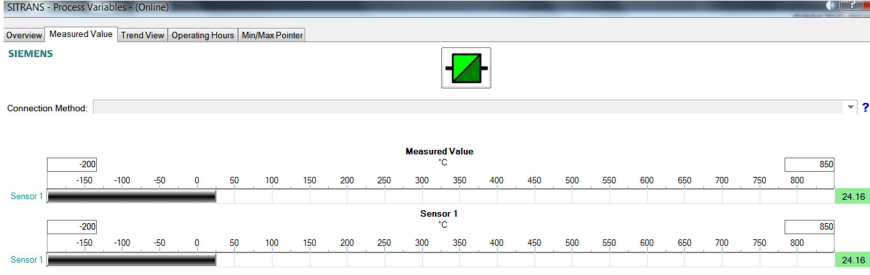## 3.2 Parameterization of the HART Device in SIMATIC PDM

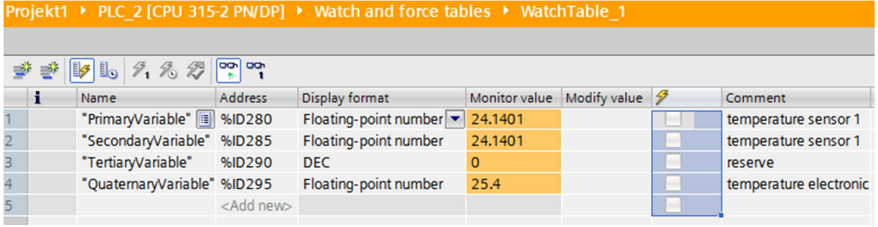Proceed as follows to parameterize the HART device in SIMATIC PDM.

Table 3-2

No.	Description
1.	In SIMATIC PDM you set the parameters for the HART device SITRANS TH300. Under "SITRANS > SITRANS TH300 > Setup > Sensor" you can set the type and sensor connection, for example. In this example we use the type Pt100 DIN IEC 751 and a two-wire sensor connection.
2.	Under "SITRANS > SITRANS TH300 > Setup > Mapping of Variables" you see which values are assigned to the primary, secondary, tertiary and quaternary variables. You can read these out later via the monitoring table in the TIA Portal or you access the HART variables from the user program via the process image.

No.	Description
3.	Under "SITRANS > SITRANS TH300 > Characteristics > Mechanical Construction" you enter the installation date. Then click the "Load to Devices" button. The "Load to Devices" dialog opens.
4.	Click "Start". The parameterization is downloaded to the HART device - SITRANS TH300, for example.

No.	Description
5.	At the end of download the status "Load to device: Action finished." is displayed. The HART device "SITRANS" is displayed green. Click the "Close" button to end the dialog.

| No.	Description
6.	You can use SIMATIC PDM to access the HART device online. Select the menu "View > Process Variables". The "SITRANS – Process Variables – (Online)" dialog opens.
7.	Here you get a display of the measured value, trend view, operating hours and the min/max pointer of the SITRANS TH300 temperature sensor.

No.	Description
8.	In the TIA Portal you can have the values of the HART variables displayed in the monitoring table. You access the HART variables via the process image of the inputs. Each HART variable consists of 4 Value bytes and one Quality Code byte.

4 Diagnostics

You can read out the diagnostics of the HART module in the TIA Portal.

In the Project tree you open the device folder of your CPU and then the subfolder "Distributed I/O". Under "PROFINET I/O System (100): PN/IE_1 > IO Device_1" you click the HART module "AI 4xI 2-wire 4..20mA HART". In the pop-up menu you select "Online & diagnostics". The "Online & Diagnostics" dialog opens.

Figure 4-1
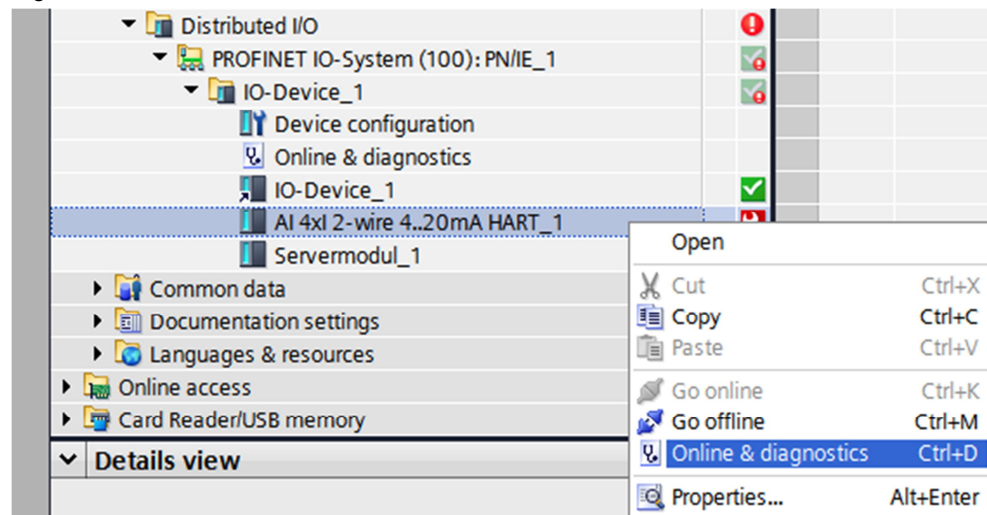
In the "Online & Diagnostics" dialog you get a display of the status and the channel diagnostics of the HART module. In this module a wire break is displayed together with the triggered HART communication error.

Figure 4-2
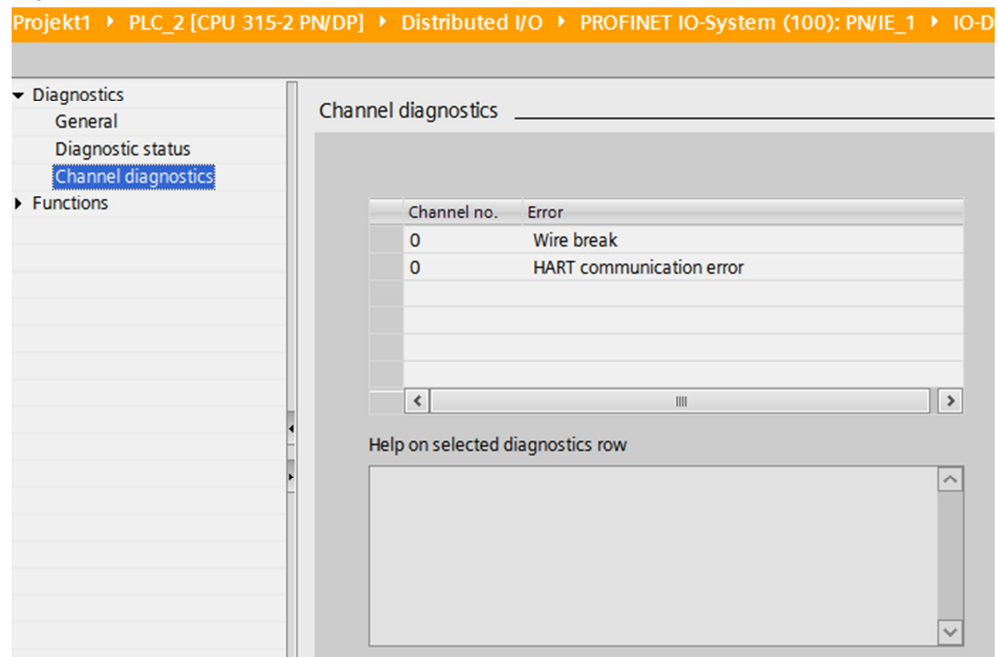
5 Additional Information

More information is available at the following links.

Table 5-1

Entry	Link
Manual: Analog Input Module AI 4xl 2-wire 4…20mA HART	https://support.industry.siemens.com/cs/ww/en/view/105037964
Product News: SIMATIC PDM V8.2	https://support.industry.siemens.com/cs/ww/en/view/92561254
Requirements for SIMATIC PDM data record routing	https://support.industry.siemens.com/cs/ww/en/view/7808062
Modules that support the "Data Record Routing" function	https://support.industry.siemens.com/cs/ww/en/view/7000978