Integration Tutorial SE01

Schneider Electric Modicon M580 and PROFIBUS for Primaries & Metal Industry

Table of Contents

1 Document Information

1.1 Purpose and Scope

This document provides a step by step description on how to integrate Endress+Hauser PROFIBUS devices with the Schneider Electric Modicon M580 system. All content of this document is jointly developed, reviewed and approved by Schneider Electric and Endress+Hauser as a common deliverable of Open Integration.

1.2 Document History

This is version 1.00.00 of this document. Version history:

Version	Released	Description
1.00.00	2015-12	Initial version

1.3 Related Documents

Please refer to related documents as listed below:

Document	Description
SD01462S/04/EN/01.15	Reference Topology SE01
SD01464S/04/EN/01.15	Integration Test Summary SE01
SD01465S/04/EN/01.15	List of Tested Devices and Versions SE01

2 Pre-Requisites

Readers of this document should be familiar with related documents as listed in chapter 1.3 and basics on how to work with the Schneider Electric Modicon M580 System and PROFIBUS in general. Please refer to recommended literature as listed in chapter 0.

2.1 Recommended Literature

2.1.1 Schneider Electric

Document	Description
EIO0000001854.02	Modicon M580 Remote I/O Modules (Hardware)
35006238.12	Modicon M580 and Premium/Atrium using Unity Pro
S1A64489.02	Profibus Remote Master User Manual

2.1.2 Endress+Hauser

Document	Description
BA00065S	FieldCare Project Tutorial
BA00070S	Fieldgate SFG500 Installation and Commissioning

2.1.3 Other

2.1.3.1 Pepperl+Fuchs

Document	Description
tdoct0835g_eng.pdf	POWERHUB Segment Coupler Manual

2.2 Operable Control System

This document assumes an operable Schneider Electric Modicon M580 System as defined by Reference Topology SE01. Please refer to the manuals listed in chapter 2.1.1 for an explanation on how to use hard- and software provided by Schneider Electric.

2.3 Operable Asset Management System

This document assumes an operable Endress+Hauser PAM System as defined by Reference Topology SE01. Please refer to manuals listed in chapter 2.1.2 for installing of hardware and software provided by Endress+Hauser.

2.4 Operable Field Network Infrastructure

This document assumes an operable PROFIBUS DP / PA field network infrastructure as defined by Reference Topology SE01. Please refer to manuals listed in chapter 2.1.3 for installing of hardware and software provided by other parties.

2.5 Operable Field Devices

This document assumes an operable selection of Endress+Hauser PROFIBUS DP and PROFIBUS PA devices connected via the field network infrastructure, as defined by Reference Topology SE01. Each field device is adequately powered and prepared with unique tag and PROFIBUS address. If required, please refer to individual device manuals for further advice.

3 Basic Integration

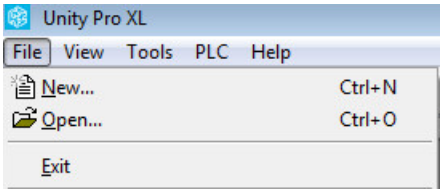
This chapter describes the main workflow for integration of a PROFIBUS network and field devices into the Schneider Electric Modicon M580 system by means of GSD. As a result, the cyclic PROFIBUS communication is running and process values with status information are available within the control strategy of the system for further processing.

3.1 System Configuration

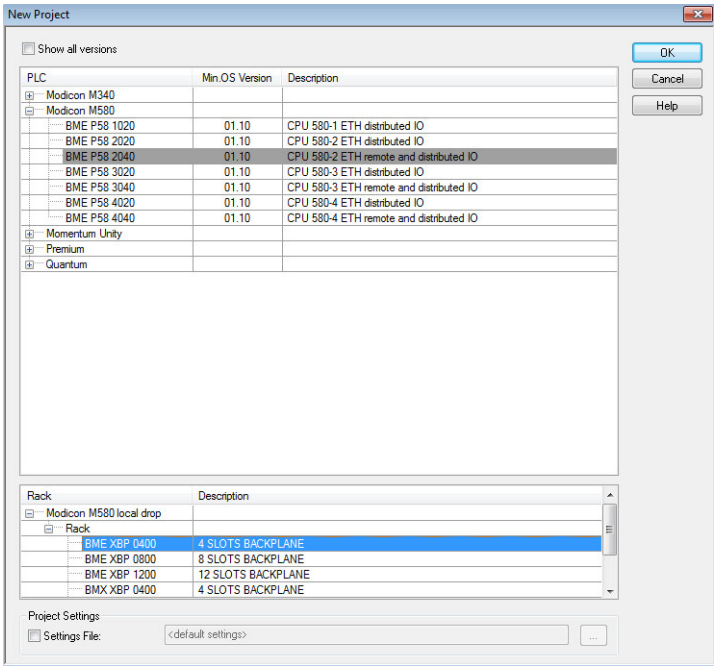
3.1.1 New project

- Start the software Unity Pro XL.

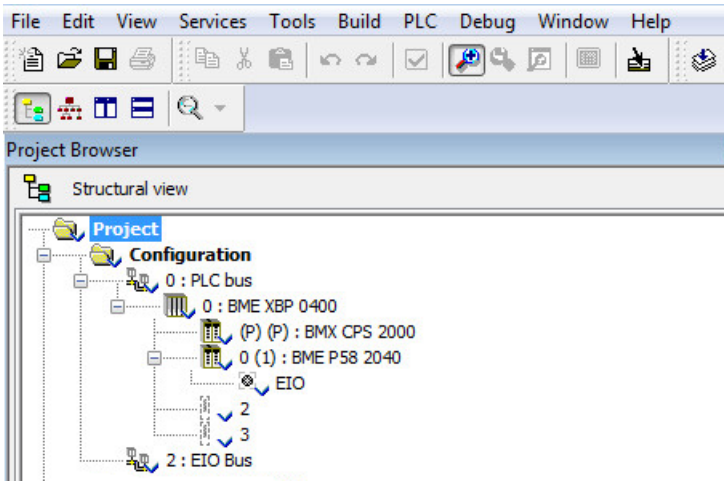
- Create a new project with the menu “File→ New…”.



- Select the PLC and Rack type.
  In this example, the PLC BME P58 2040 is mounted on a Rack BME XBP 0800.



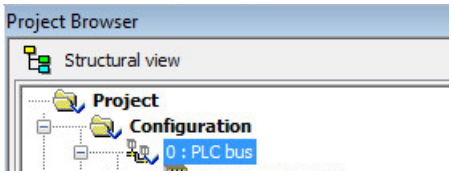
- Created Project structure.



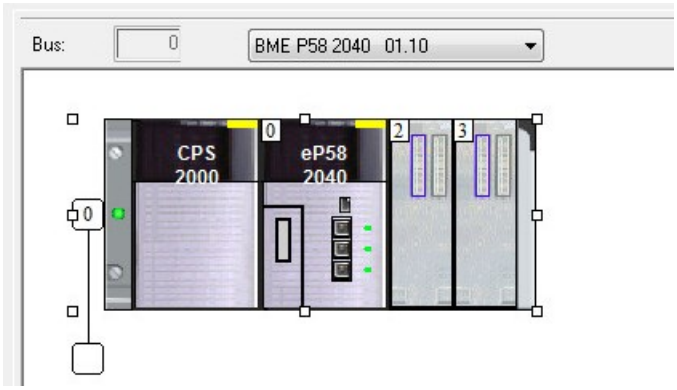
3.1.2 Modicon M580 hardware configuration

3.1.2.1 PLC Rack

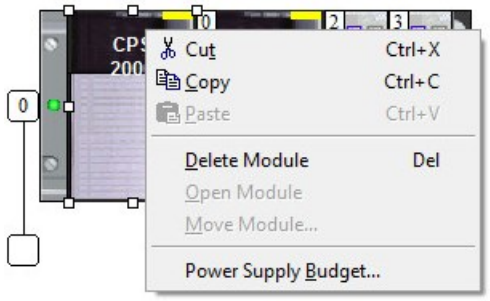
- Double-click on the field “0: PLC bus” in the Project Browser view.



- The PLC module is inserted automatically with the power supply CPS2000.

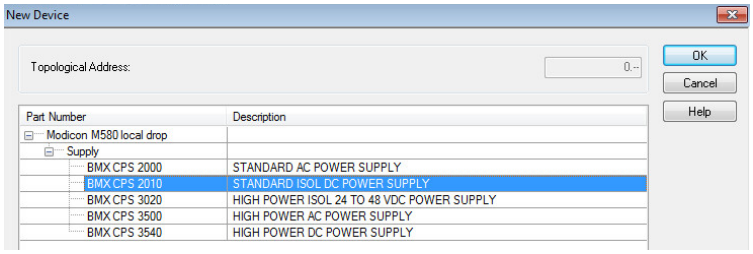


  - In our example, the Power Supply module CPS2010 is used.
    Delete the current one by right-clicking on the symbol CPS2000 and select the menu “Delete Module”.

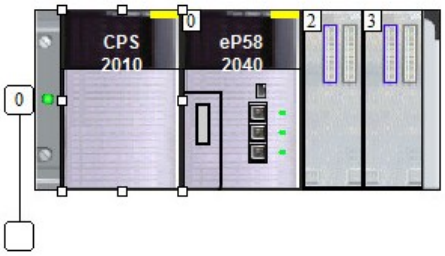


- The power supply module is now deleted.

- Double-click on the empty module and select the correct power supply module. In this case, it is the module BMX CPS 2010.

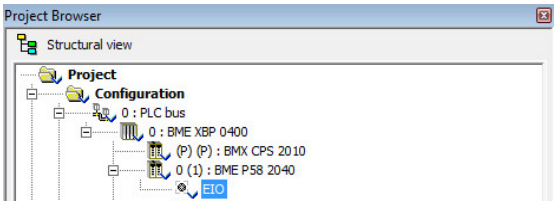


- PLC rack configuration.

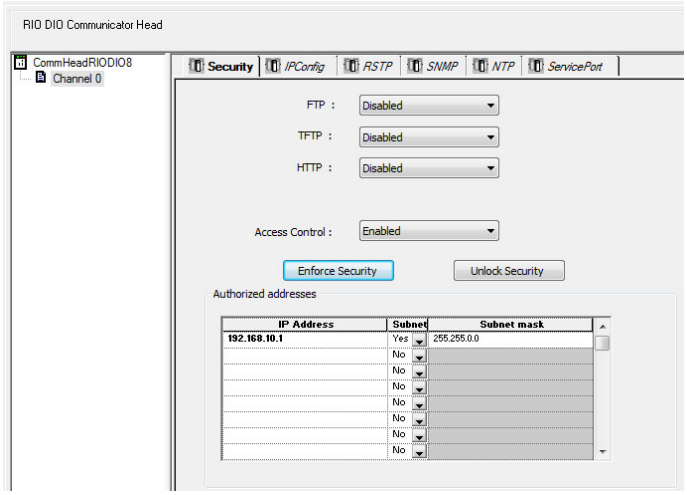


3.1.2.2 PLC IP address

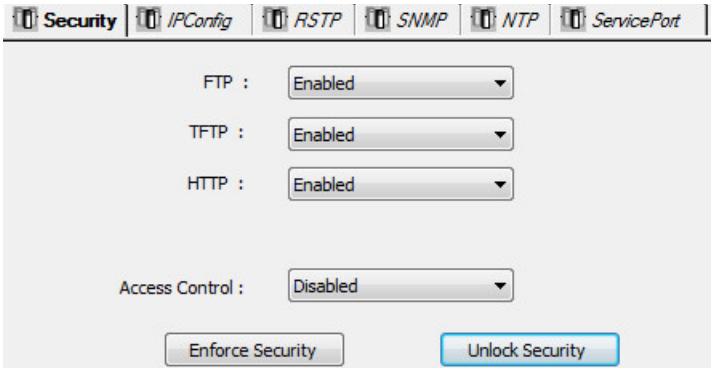
- In the Project Browser, double-click on the field “EIO”.



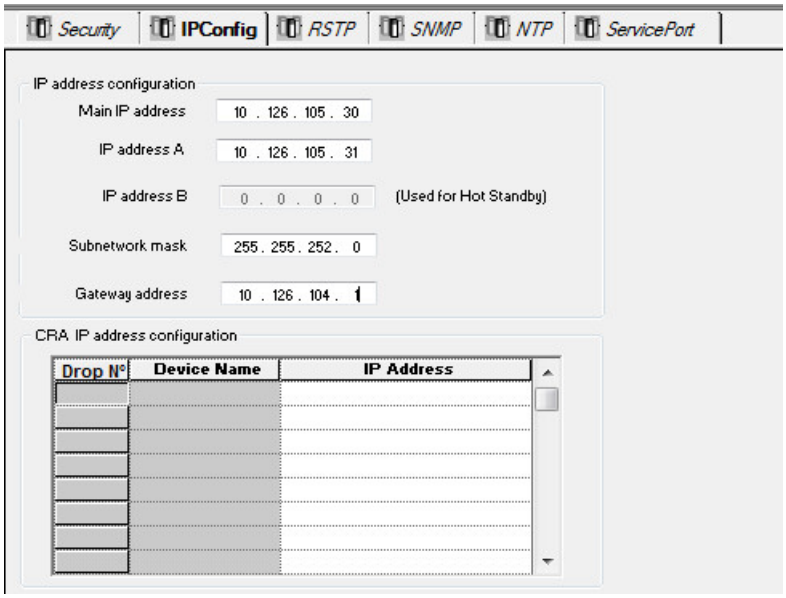
- Following window is displayed.



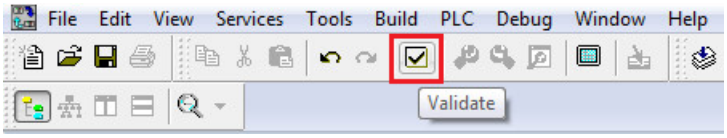
- Click on the button “Unlock Security”. This enables the FTP/ TFTP / HTTP options.



- Select the Tag “IPConfig”.
  Configure the IP addresses according to the connected network.
  In this example:
  - The main PLC IP address is 10.126.105.30
  - The PLC IP address A is 10.126.105.31
  - The subnet mask is 255.255.252.0
  - The default gateway IP address is 10.126.104.1

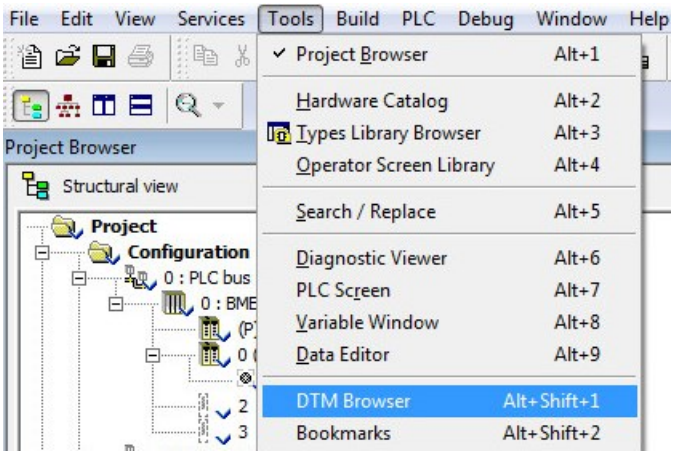


- Save the configuration by clicking on the symbol "Validate" in the tool bar.

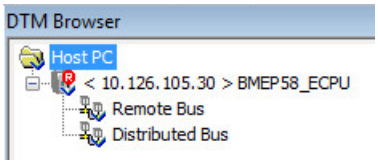


3.1.2.3 PLC DTM

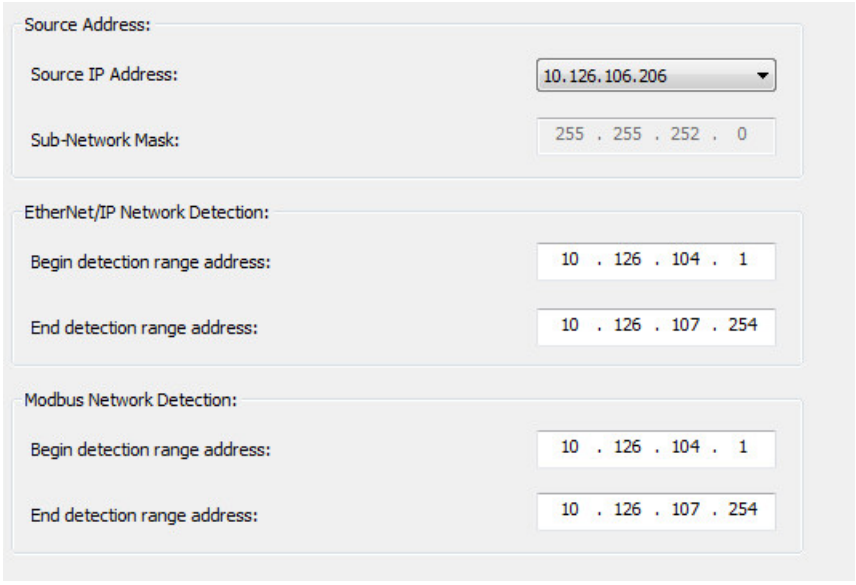
- Click on the menu Tools→DTM Browser in the Tool bar.



- The DTM Browser displays already the configured PLC IP address, 10.126.105.30 in this example. Double-click on the DTM "BMEP58_ECPU".

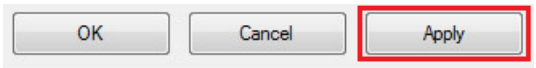


- Following window is displayed.

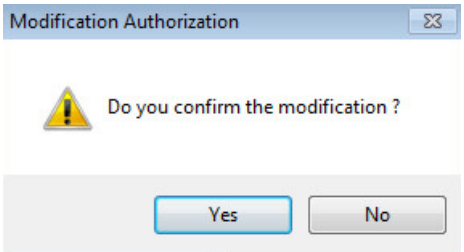


- Check the source IP address (IP address of the engineering station).
- Re-adjust the Ethernet/IP Network Detection and Modbus Network Detection Range addresses according to the network configuration.

- Click on the button “Apply” to validate the changes.



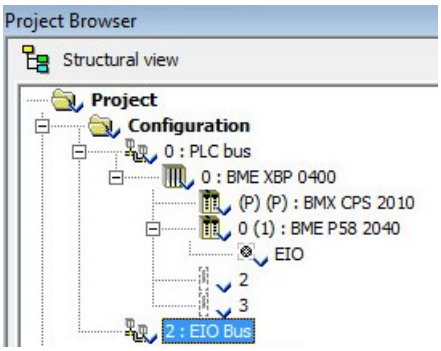
- Confirm the Message Box by clicking on the button “Yes”.



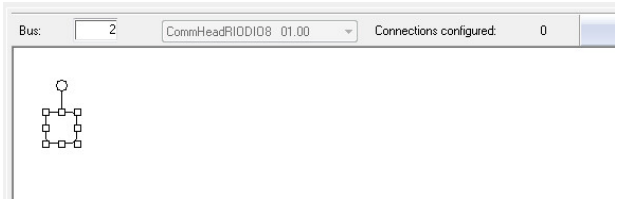
3.1.3 Modicon X80 hardware configuration

3.1.3.1 I/O platform Rack

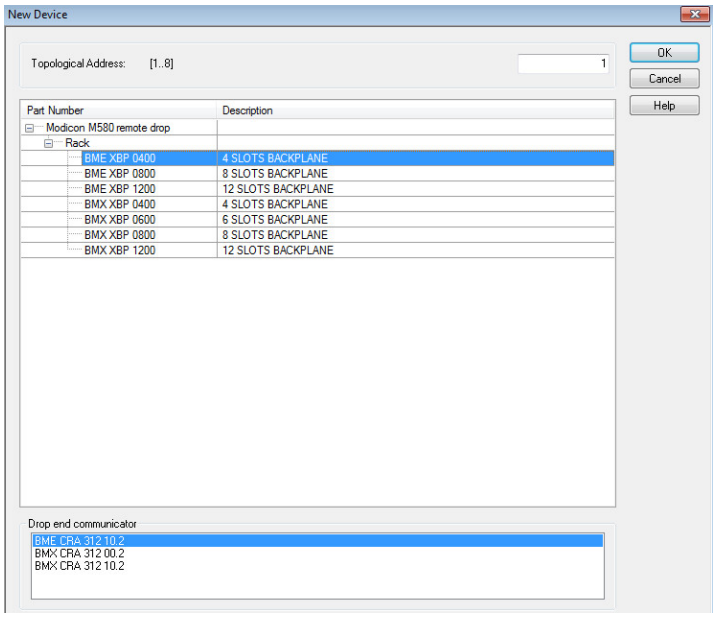
- Double-click on the field "2: EIO bus" in the Project Browser view.



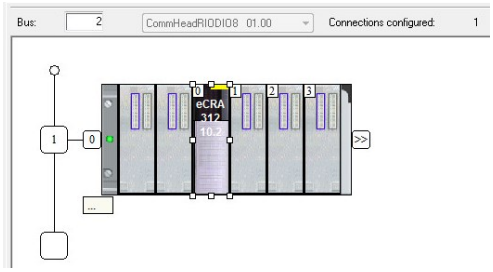
- This opens the following window. Double-click on the white square.



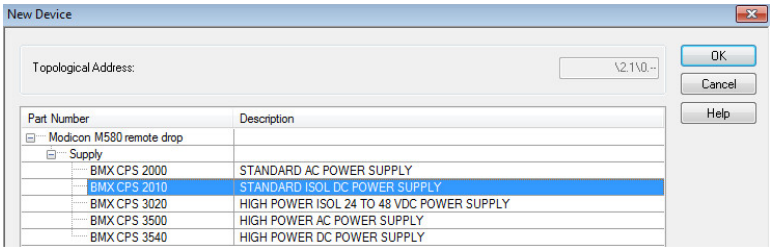
- Select following parameters according to the SE01 topology architecture:
  - The topological address 1
  - The Rack BME XBP 0400
  - The EIO Drop adapter BME CRA 312 10.2



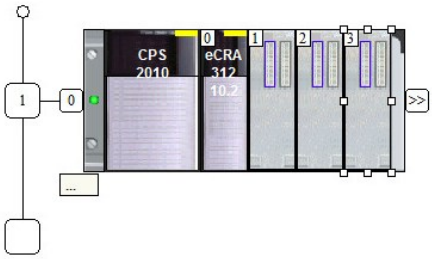
- Inserted EIO Drop adapter BME CRA 312 10.2



- Double-click on the 1st empty slot to insert the power supply CPS2010.



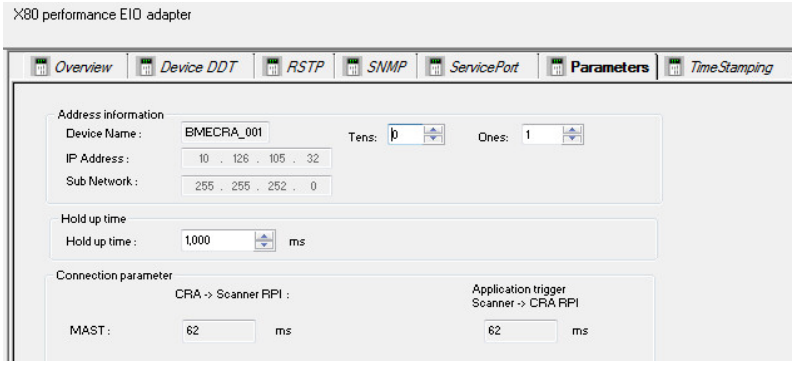
- I/O platform rack.



3.1.3.2 I/O platform EIO adapter IP address

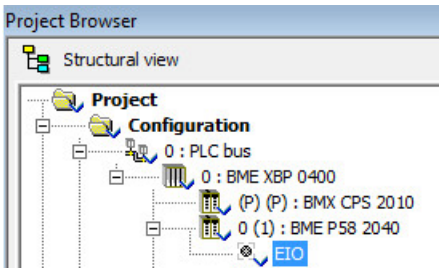
A default IP address is automatically set for the EIO adapter BME CRA 312 10.2 according to the PLC and network configuration.

- Click on the tag “Parameters” to display the EIO adapter IP address.

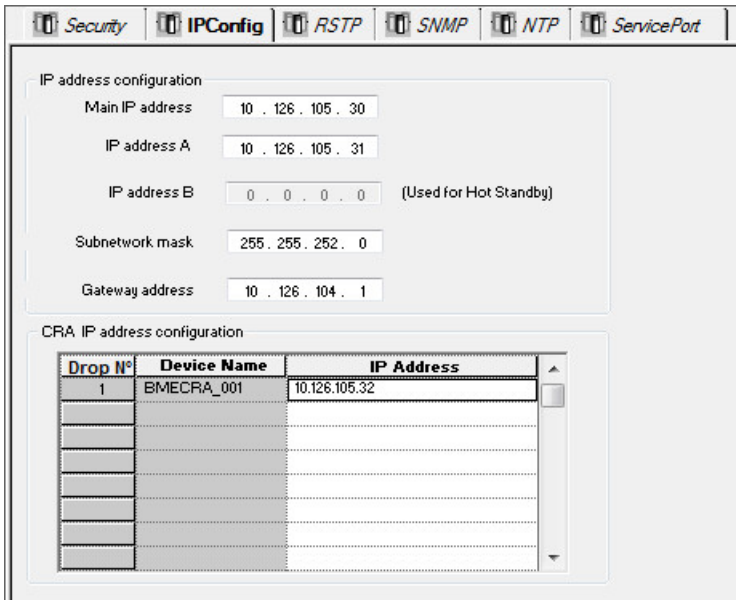


- If needed, the EIO adapter IP address can be changed.

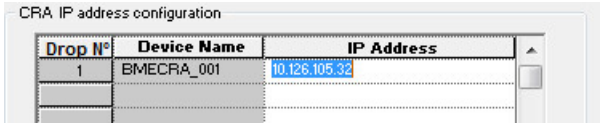
- In the Project Browser view, double-click on the field “EIO” of the menu “0: PLC Bus”.



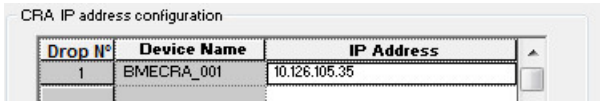
- The EIO adapter IP address is inserted in the part “CRA IP address configuration”.



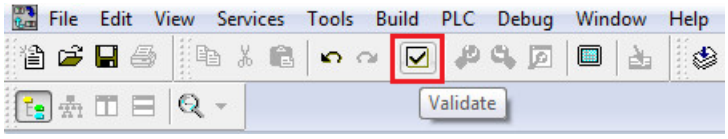
- Double-click on the IP address.



- Change the IP address to the requested one.



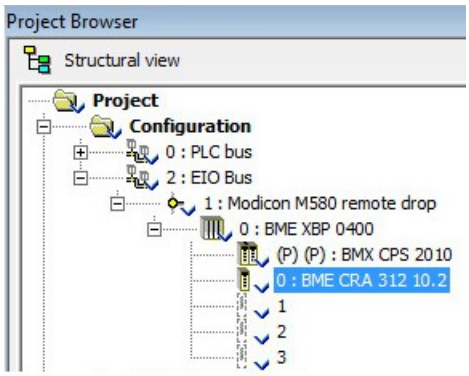
- Save the configuration by clicking on the symbol “Validate” in the tool bar.



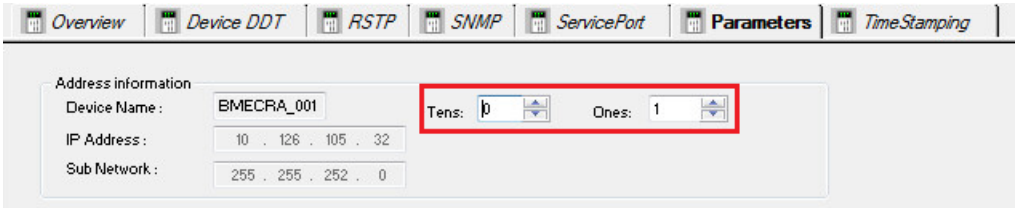
For the next steps, the EIO adapter IP address is set to the IP address 10.126.105.32.

3.1.3.3 I/O platform EIO adapter device name

- In the Project Browser, double-click on the field “0 : BME CRA 312 10.2”.

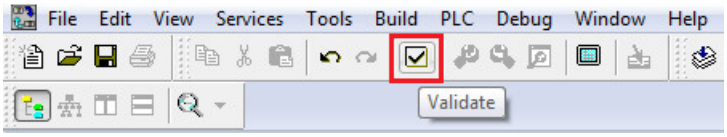


- Configure the device name to the requested one with the fields “Ten” and “Ones”.
  In this example, device name is BMECRA_001.



- Set this device name on the EIO adapter thanks to the rotary switches.
  In this example, the address is set to 1 for the device name BMECRA_001.

- Save the configuration by clicking on the symbol “Validate” in the tool bar.



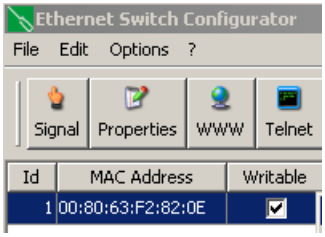
3.1.4 DRS switch configuration

- Connect the engineering station directly to the DRS switch.

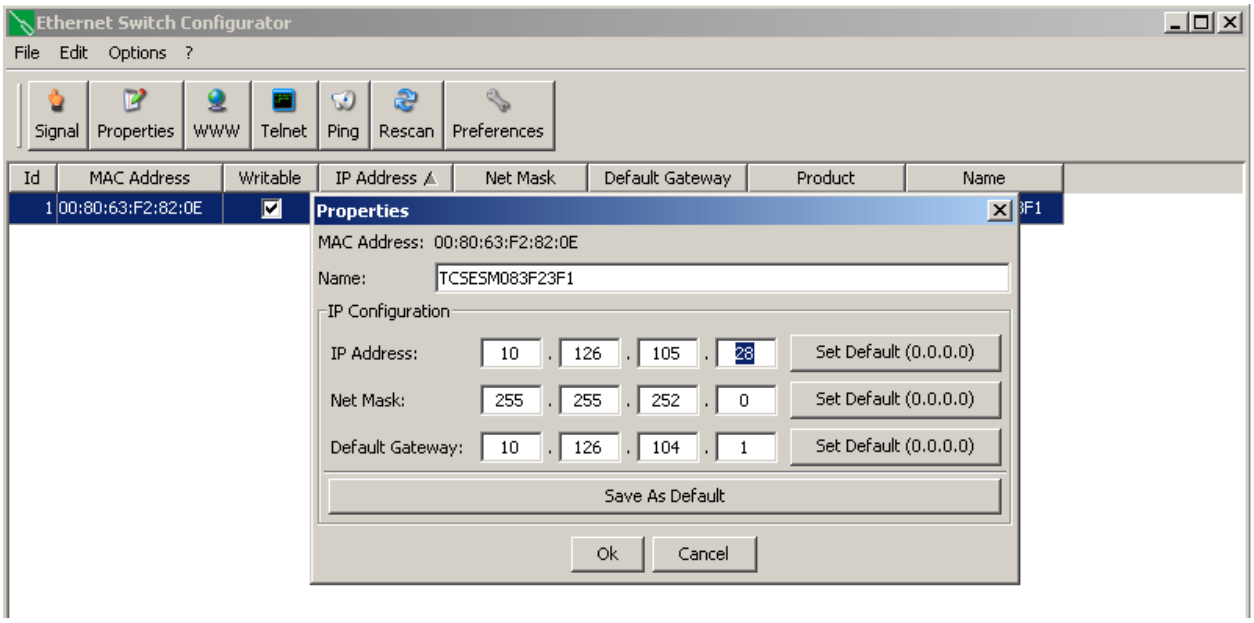
- Start the software Ethernet Switch Configurator.

- The function “scan” is automatically started.
  Connected devices are displayed in the window. The connected DRS switch can be identified with the MAC address which is written on the device. If the DRS switch was never configured, the IP address is 0.0.0.0.

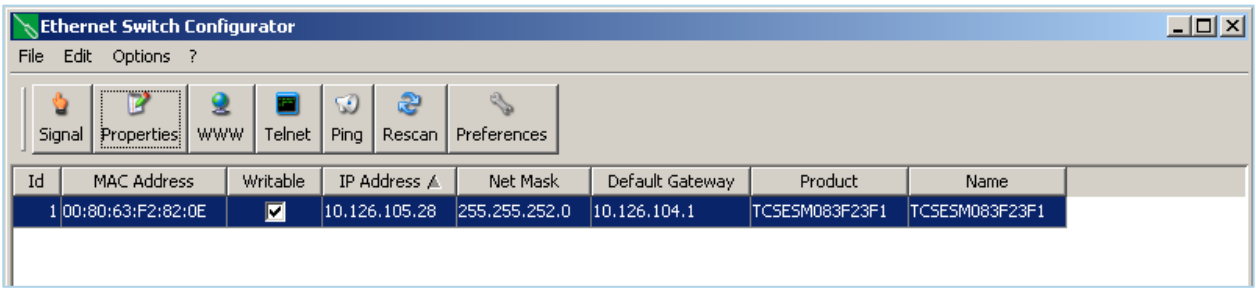
- Select the MAC address field and click on the menu “Properties”.
  In this example, the MAC address is 00:80:63:F2:82:0E.



- Configure the DRS switch IP address according to the connected network.
  In this example:
  - DRS switch IP address is 10.126.105.28
  - Net Mask address is 255.255.252.0
  - Default Gateway is 10.126.104.1



  - Click on the button “Ok” to save the settings.
  - IP settings have been updated.

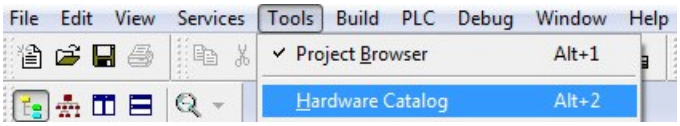


3.1.5 PRM Gateway configuration

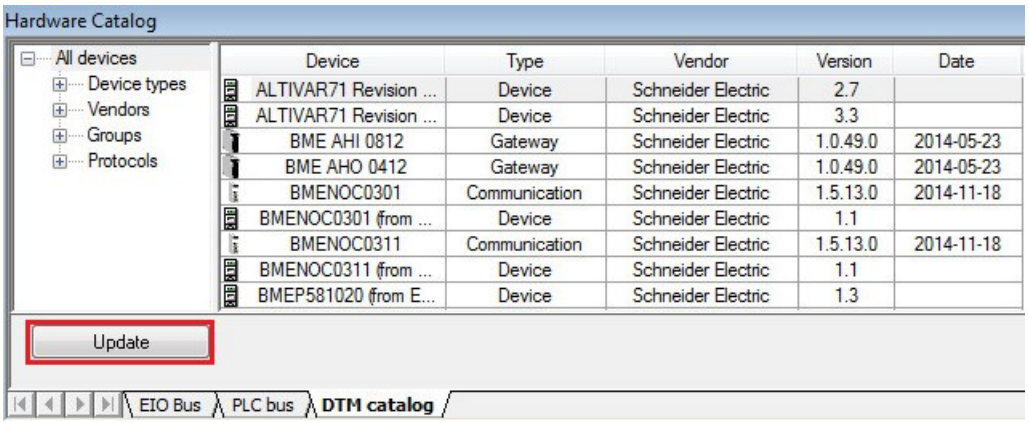
3.1.5.1 DTM library

The installation of the DTM "Gateway DTM V1.2" is required in order to configure the PRM Gateway. This library can be found on the PROFIBUS Remote Master CD-ROM.

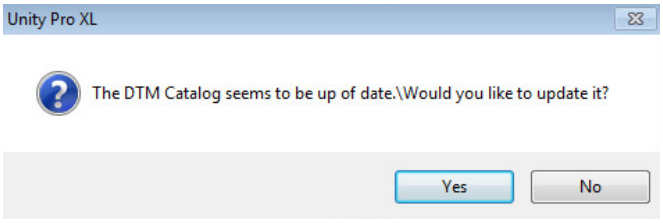
- Once the Gateway DTM Library installed, the new components can be displayed in the DTM catalog.
  Click on the menu "Tools→Hardware Catalog".



- Select the Tag "DTM catalog" and click at on the button "Update" to display the new installed components.



- Following Message Box is displayed.
  Click on the button "Yes".



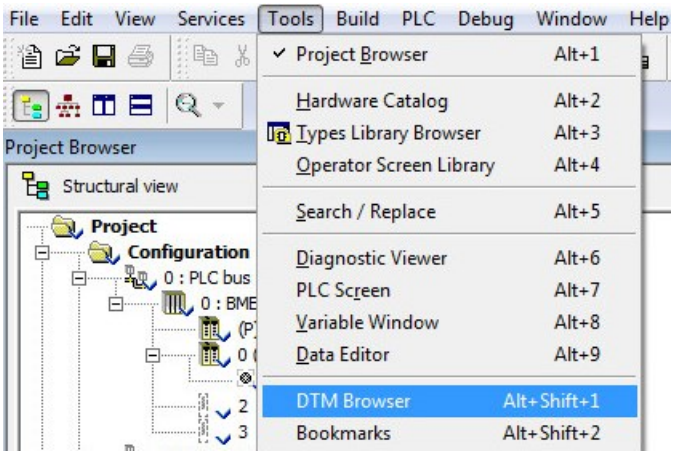
- Installed components

	PRM Comm	Communication	Schneider Electric	1.x	
	PRM Gateway	Gateway	Schneider Electric	1.2	2014-02-26
	PRM Master	Communication	Schneider Electric	1.x	

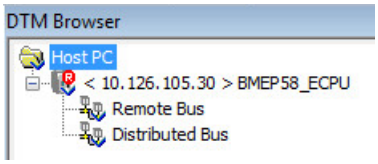
3.1.5.2 DTM Browser project structure

3.1.5.2.1 PRM Gateway DTM

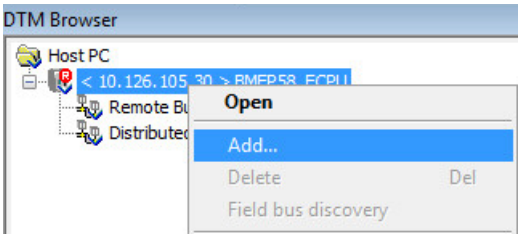
- Click on the menu "Tools→DTM Browser" in the Tool bar.



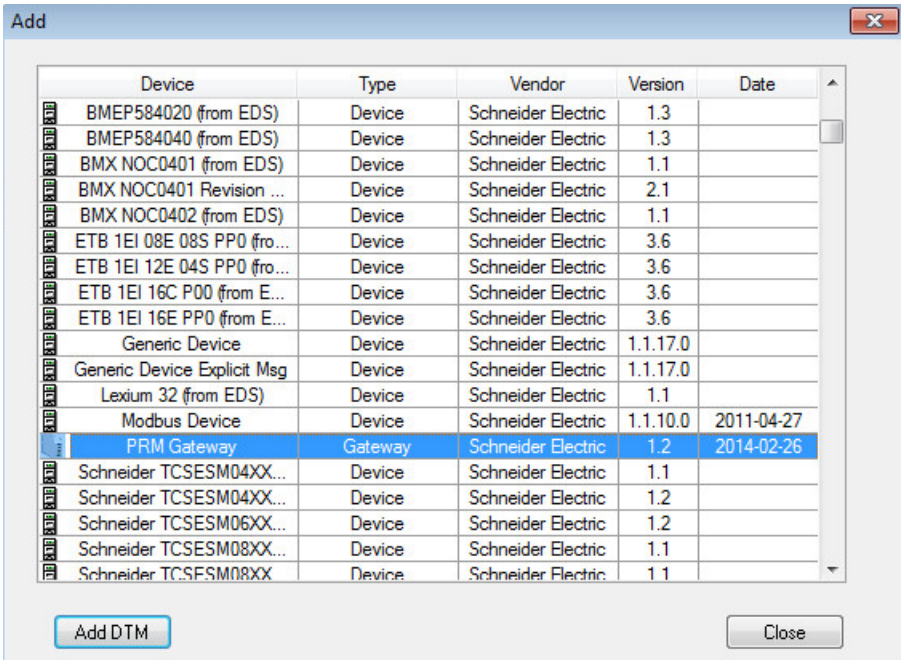
- The DTM Browser displays already the configured PLC IP address.



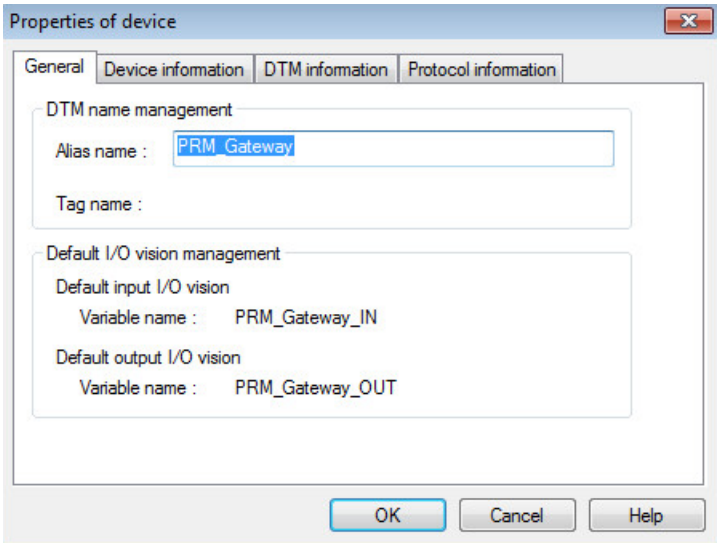
- Right-click on the PLC and click on the menu "Add".



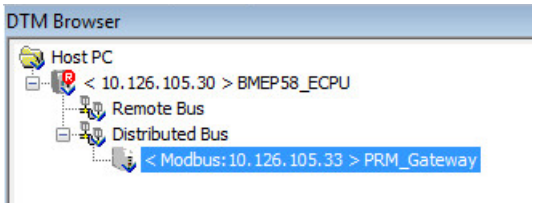
- Select the PRM Gateway and add it to the DTM Browser project structure by clicking on the button "Add DTM".



- Click on the button "OK".

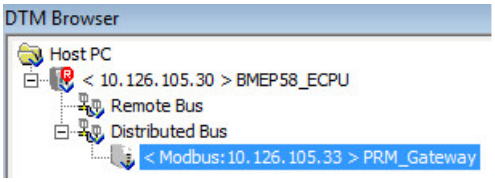


- The PRM Gateway is now part of the DTM browser project structure.

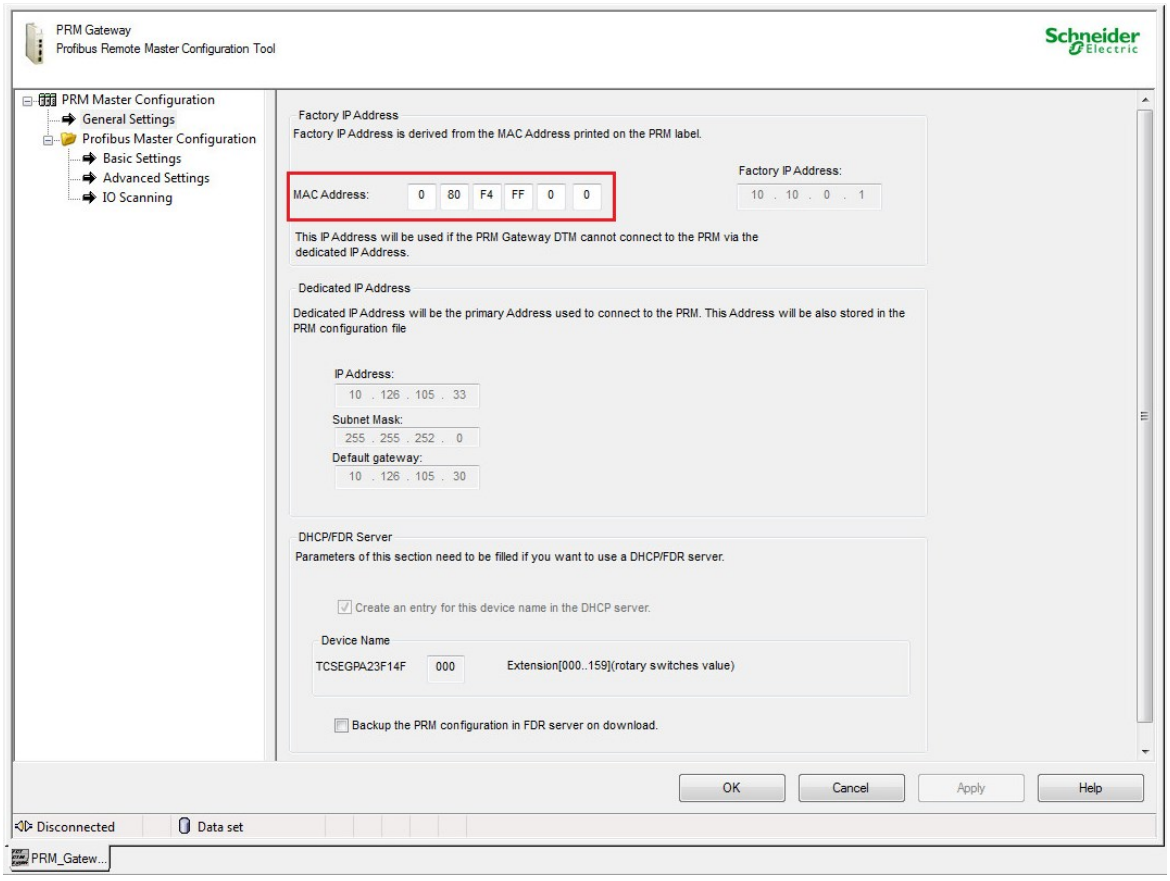


3.1.5.2.2 PRM Gateway MAC address

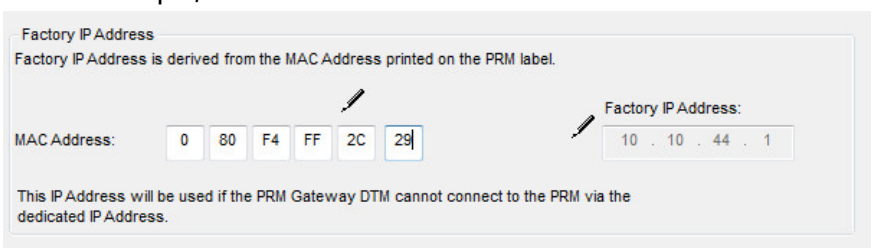
- Double-click on the PRM Gateway DTM.
  This corresponds to the menu “Offline Parameter”.



- The PRM Gateway MAC address must be configured. This address is written on the PRM Gateway.



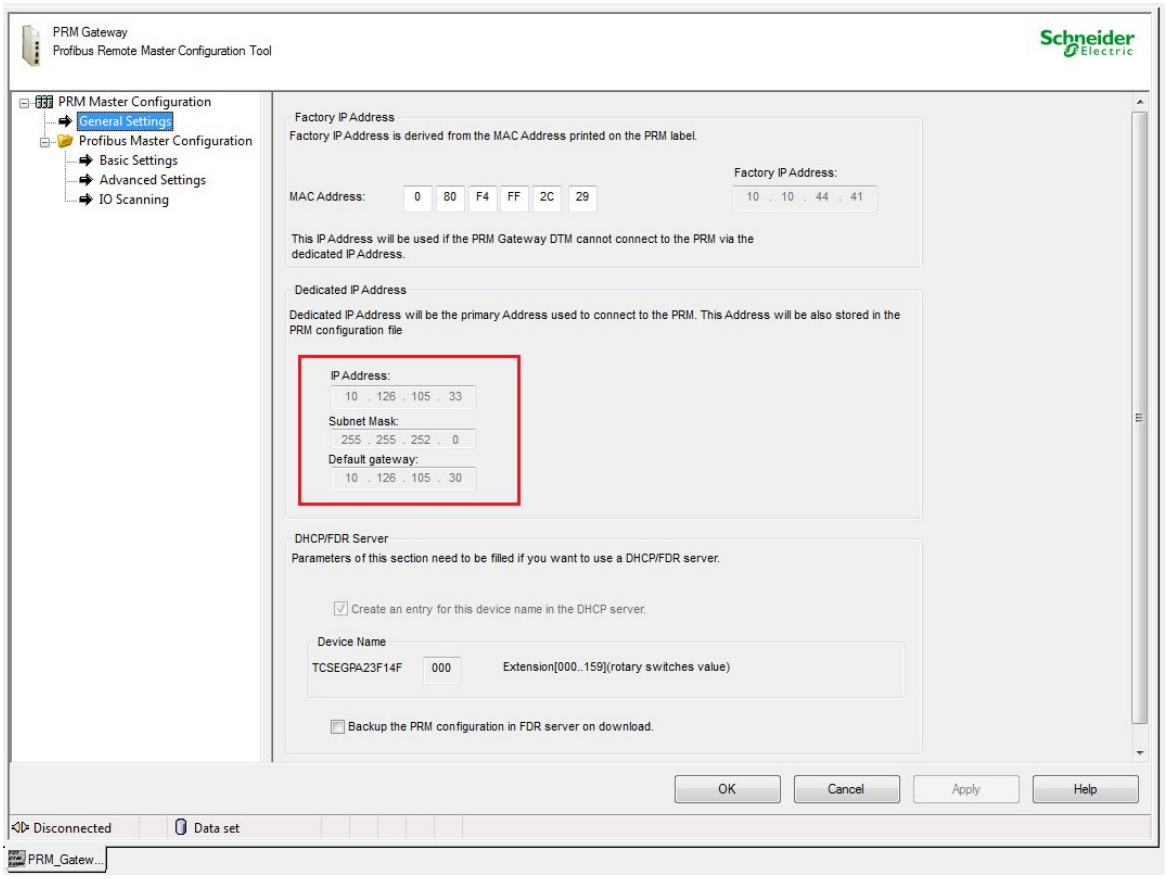
- Enter the MAC address :
  In this example, the MAC address is 00:80:F4:FF:2C:29.



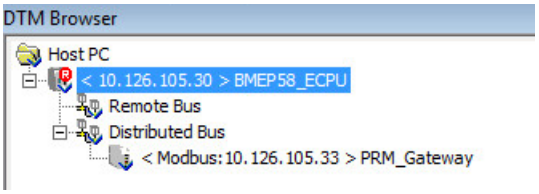
- Click on the button “Apply” to validate the changes.

3.1.5.2.3 PRM Gateway IP address

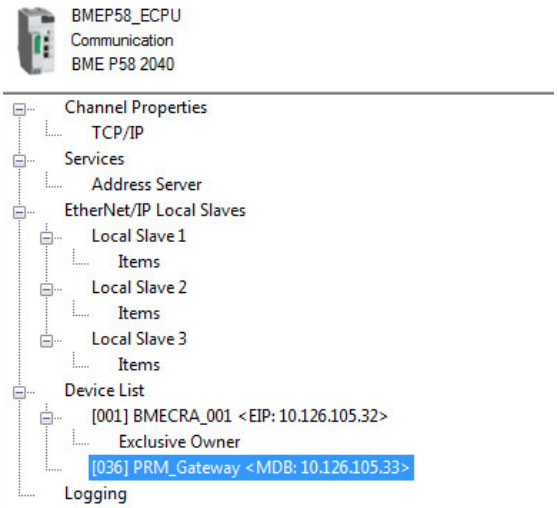
- A default IP address is automatically set for the PRM Gateway according to the PLC and network configuration.
  This IP address cannot be edited in this menu.



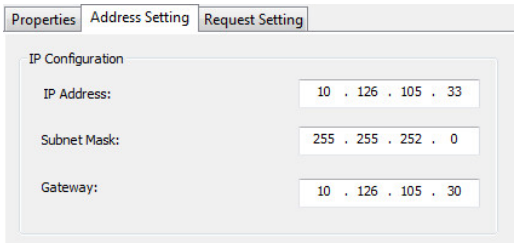
- The PRM Gateway IP address can be edited by opening the PLC DTM.
  In the DTM Browser view, double-click on the DTM “BMEP58_ECPU”.



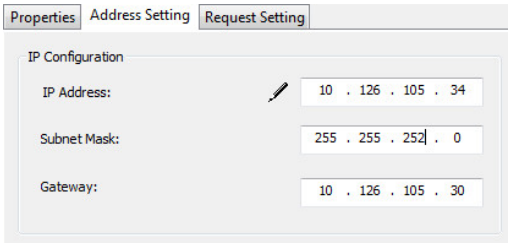
- In the device list, select the PRM Gateway.



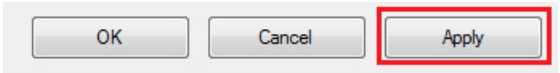
- Select the Tag “Address Setting”.



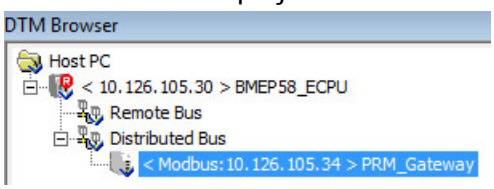
- Enter the new IP address and click on the keyboard button “Enter”.



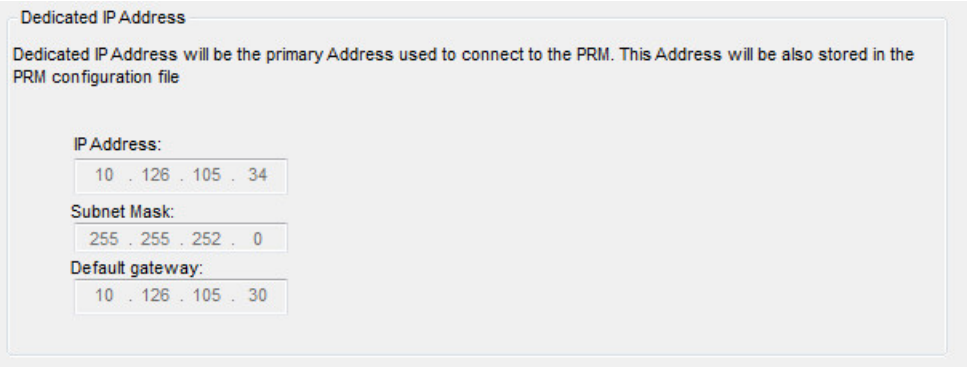
- Save the new settings by clicking on the button “Apply”.



- As a consequence:
  - The DTM Browser project structure is automatically updated.



- The IP address in the PRM Master Configuration is automatically updated.



For the next steps, the PRM Gateway IP address is set to the IP address 10.126.105.33.

3.1.5.3 PRM Gateway working mode

The PRM Gateway can be configured either with DHCP mode for dynamic IP assignment or Store mode for fixed IP address. The mode must be selected on the PRM Gateway by using the rotary switches and configured accordingly in the DTM browser of Unity Pro.

3.1.5.3.1 Clear IP steps

This step is needed to delete the PRM configuration file.

- Shut down the PRM Gateway power supply.
- Disconnect the PRM Gateway Ethernet cable.
- Remove the PRM Gateway from its backplane.
- Set the address **0** for the upper rotary switch and **E** for the lower rotary switch.

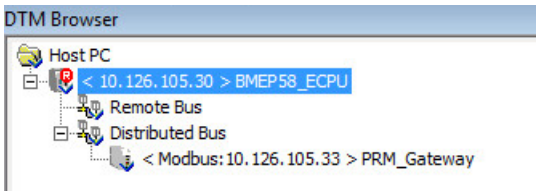
- Mount the PRM Gateway on its backplane.
- Energize the PRM Gateway.
- The PRM Gateway LED SF is red.

3.1.5.3.2 DHCP Mode configuration steps

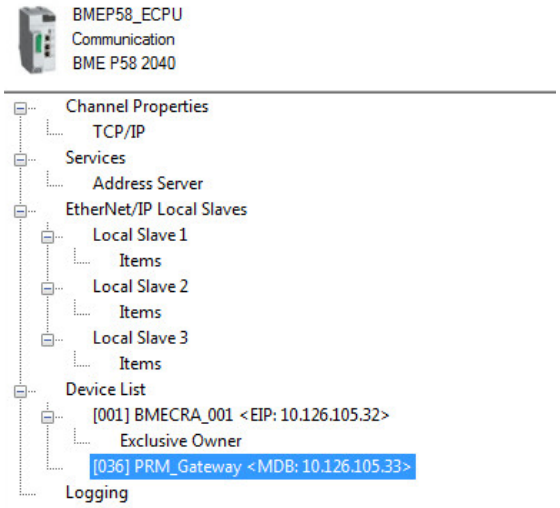
In DHCP mode, the PRM Gateway device name needs to be configured. The device name is made of a fixed part (“TCSEGPA23F14F)” as well as a 3 digits numerical extension, whose value is between 0 and 159. This numerical extension corresponds to the code set on the PRM Gateway rotary switches.

In the following DHCP configuration example, the configured device name is “TCSEGPA23F14F001”.

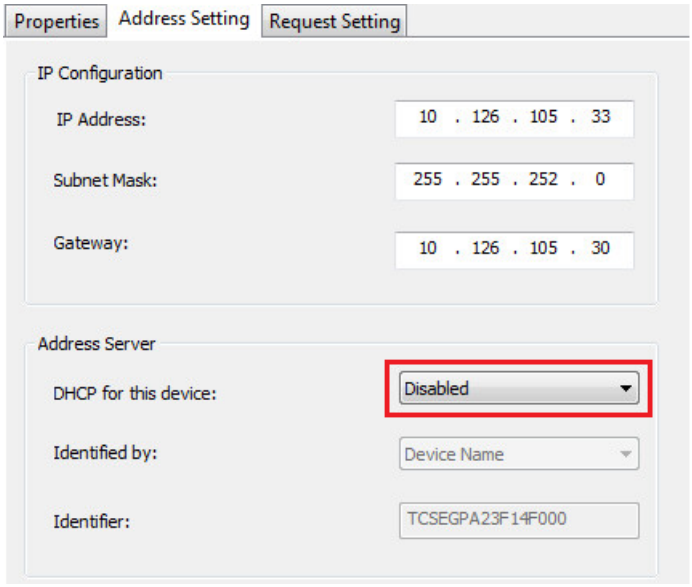
- **DTM configuration**
  - In the DTM Browser view, double-click on the DTM “BMEP58_ECPU”.



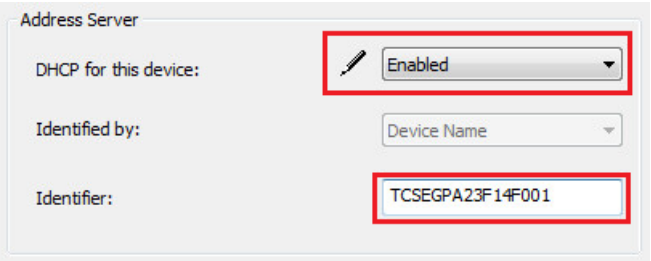
  - In the device list, select the PRM Gateway.



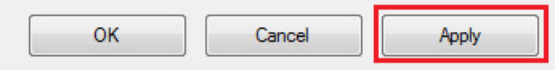
  - Select the Tag “Address Setting”.
    The DHCP mode is in status “Disabled”.



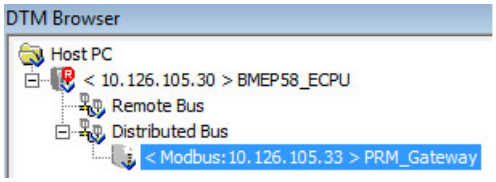
- Select the option “Enable” and change the identifier from TCSEGPA23F14F000 to TCSEGPA23F14F001.



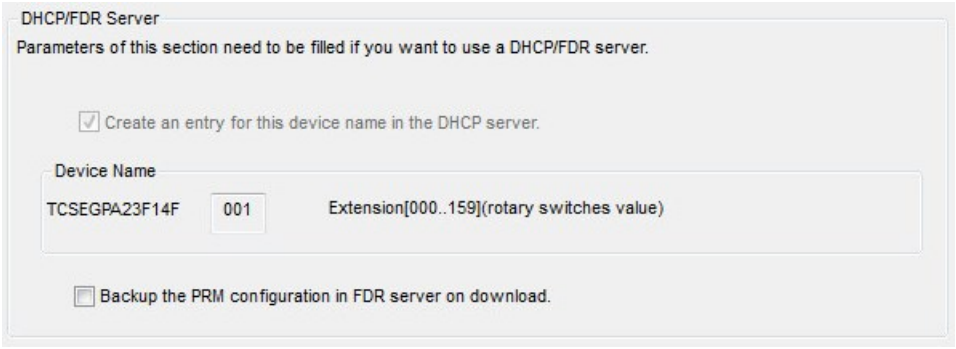
- Save the new settings by clicking on the button “Apply”.



- Double-click on the PRM Gateway DTM.

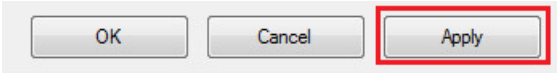


- The device name is automatically updated to the new device name “TCSEGPA23F14F001”.

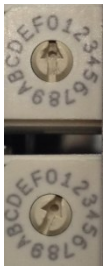


- Select the option “Backup the PRM configuration in FDR server on Download”.

- Save the new settings by clicking on the button “Apply”.



- **PRM address configuration**
  - Realize at first a Clear IP as explained in the previous chapter.
  - Shut down the PRM Gateway power supply.
  - Remove the PRM Gateway from its backplane.
  - Set the address **0** for the upper rotary switch and **1** for the lower rotary switch.



  - Mount the PRM Gateway on its backplane.
  - Energize the PRM Gateway.
  - The PRM Gateway LED SF is red.

Remarks:

The DHCP mode allows an address configuration between 0 and 159. That means device name from TCSEGPA23F14F**000** to TCSEGPA23F14F**159**. The two first digits correspond to the upper rotary switch value multiplied by a factor 10 and the last digit corresponds to the lower rotary switch value.

- *Rotary switches configuration example for device name TCSEGPA23F14F**148:***

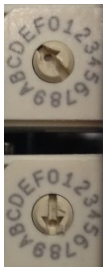
"148"

„14" are the two first digits of 148

$(14)_{10} = (E)_{16}$

„8" is the last digit of 148

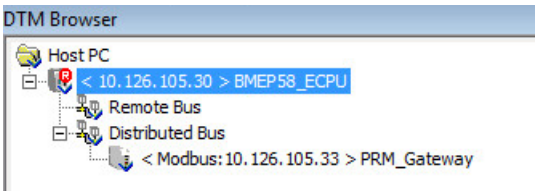
$(8)_{10} = (8)_{16}$



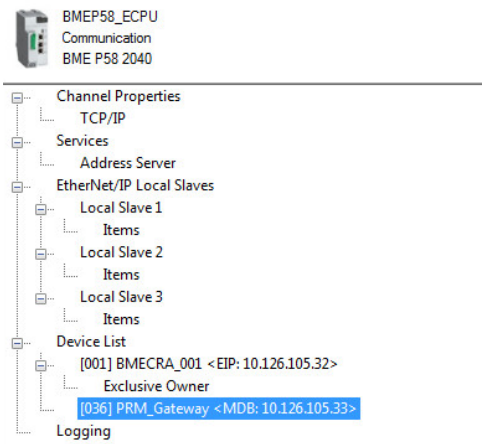
➔ Schneider Electric recommends not using names between TCSEGPA23F14F**060 and** TCSEGPA23F14F**099.**

3.1.5.3.3 Stored mode configuration steps

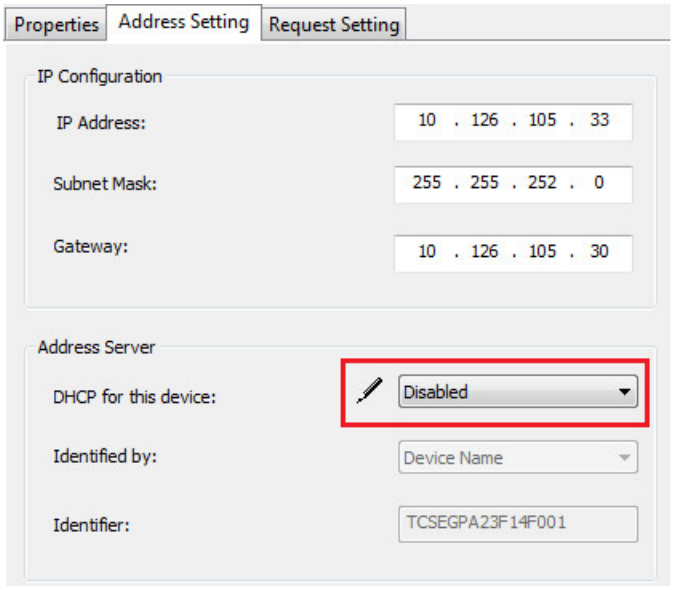
- **DTM configuration**
  - In the DTM Browser view, double-click on the DTM BMEP58_ECPU.



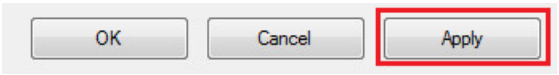
  - In the device list, select the PRM Gateway.



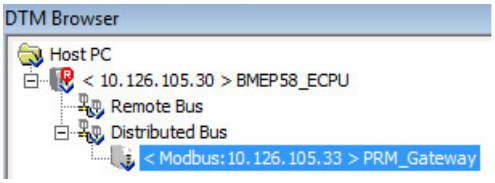
- Select the Tag “Address Setting” and select the status “Disabled”.



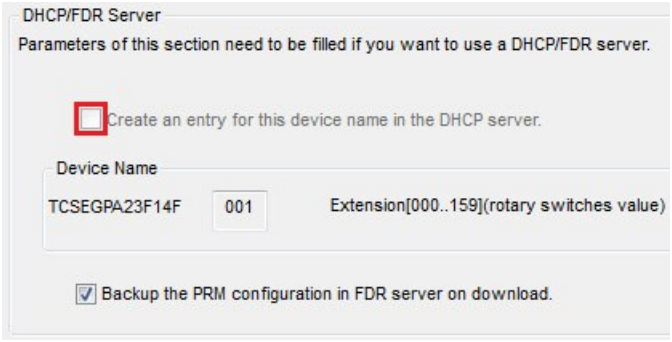
- Save the new settings by clicking on the button “Apply”.



- Double-click on the PRM Gateway DTM.

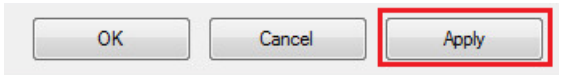


- This disables automatically the DHCP mode.

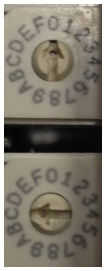


- Unselect the option “Backup the PRM configuration in FDR server on download”.

- Save the new settings by clicking on the button “Apply”.



- **PRM address configuration**
  - Realize at first a Clear IP as explained in the previous chapter.
  - Shut down the PRM Gateway power supply.
  - Remove the PRM Gateway from its backplane.
  - Configure the Store Mode.
    Set the address **0** for the upper rotary switch and **C** for the lower rotary switch.



  - Mount the PRM Gateway on its backplane.
  - Energize the PRM Gateway.
  - The PRM Gateway LED SF is red.

For the next steps, the PRM Gateway IP address is configured with the DHCP mode, with the device name “TCSEGPA23F14F001”.

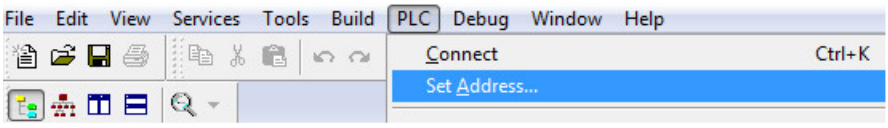
3.1.6 Connection to PLC

The first download will have to be done with the USB interface because no IP addresses are set in the PLC.

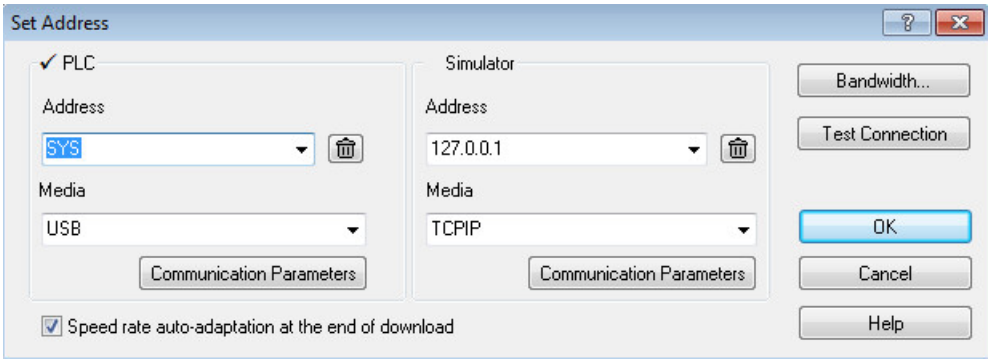
In this example, the PLC IP address is at first downloaded via USB. Then, it is the Ethernet connection which is used to download the other parts of the project configuration.

3.1.6.1 Connection via USB interface

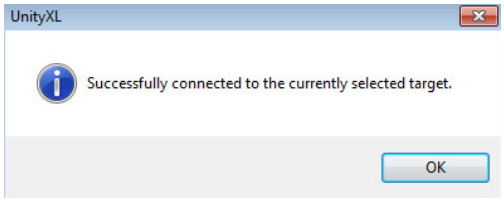
- Connect the USB cable from the PLC USB port to the engineering station one.
- In the tool bar, click on the menu "PLC→Set Address".



- Select the Address type "SYS" and the Media type "USB".



- Test if the connection is established by clicking on the button "Test Connection".
  - If successful, following message is displayed.
  - Click on the button "OK".



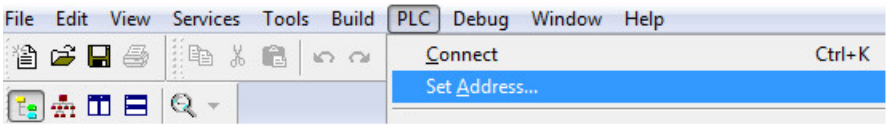
- Click on the button "OK" to close the window "Set Address".

3.1.6.2 IP settings configuration download via USB

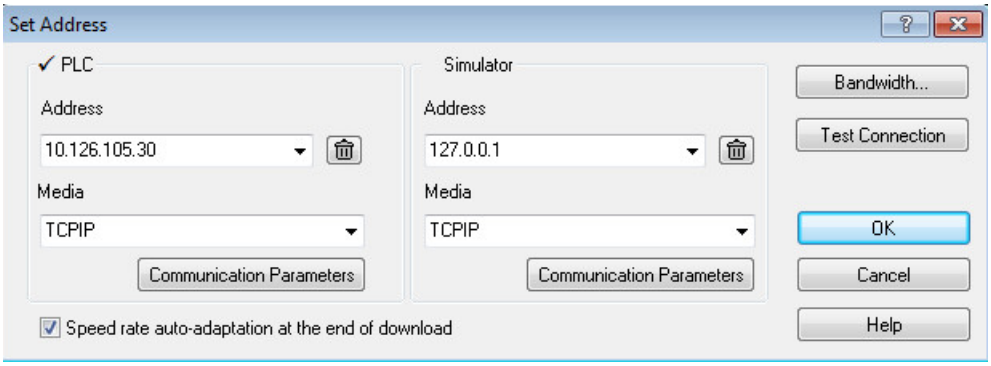
- Download the IP configuration in the PLC.
  →Refer to part **3.4.1 Project Compilation** and **part 3.4.2.1 Project Download in PLC** to proceed.

3.1.6.3 Connection via Ethernet

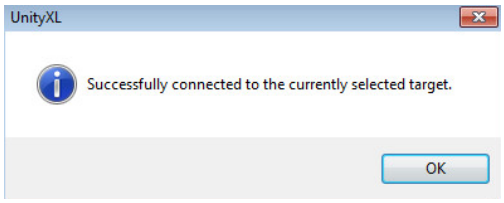
- In the tool bar, click on the menu "PLC→Set Address".



- Enter the PLC IP address as Address type and select the Media type "TCPIP".
  In this example, the PLC IP address is 10.126.105.30.



- Test if the connection is established by clicking on the button "Test Connection".
  - If successful, following message is displayed.
  - Click on the button "OK".

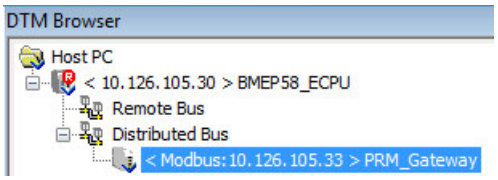


- Click on the button "OK" to close the window "Set Address".

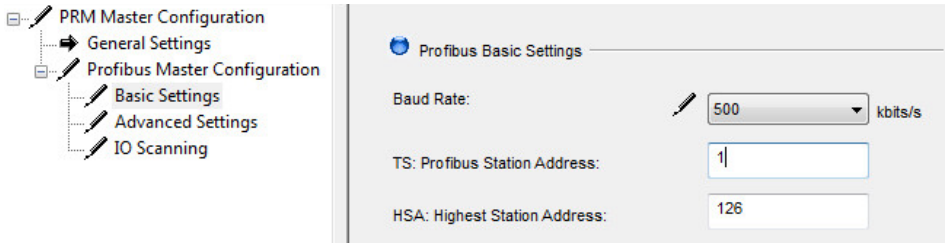
3.2 Field Network Configuration with GSD

3.2.1 PROFIBUS master settings configuration

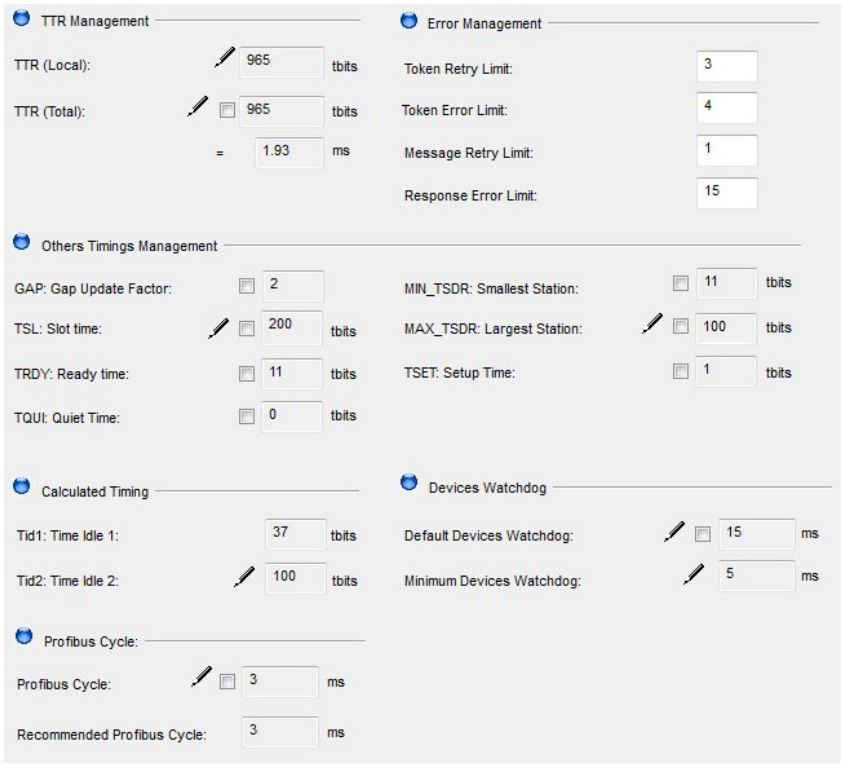
- Double-click on the PRM Gateway DTM.



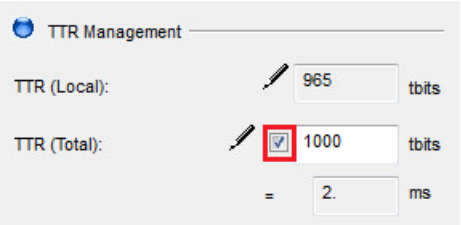
- Basic Settings configuration
  - Configure the requested Baud rate, 500 kBaud in this example.
    All standard Baud rates are available.
  - Configure the PROFIBUS master station address, @1 in this example.
  - Configure the HSA address, @126 in this example.



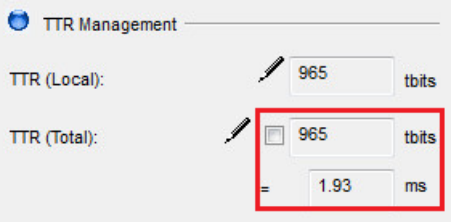
- Advanced Settings.
  - These timing parameters are automatically calculated.



- To edit them manually, select the check box and change the value.

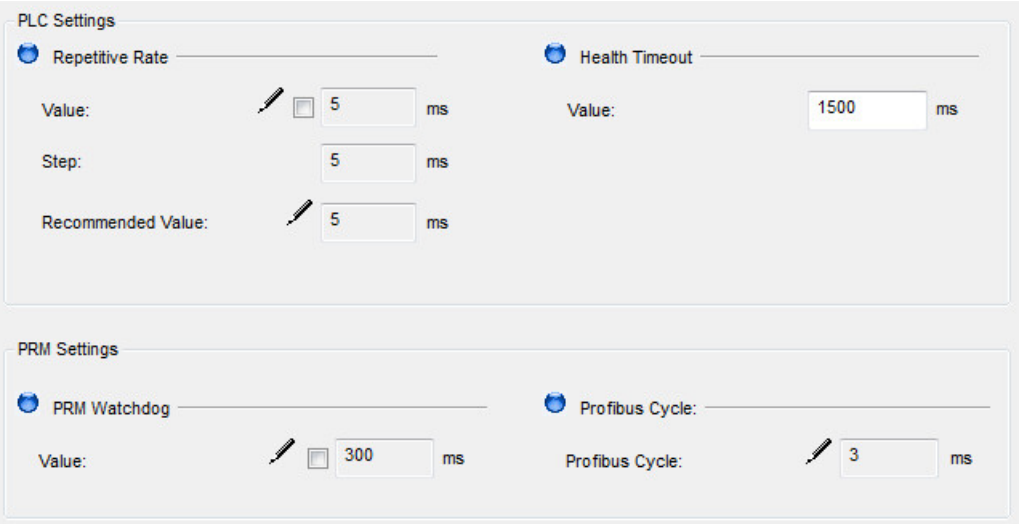


- The standard parameter is written back when the check box is unselected.

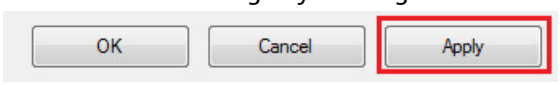


➔ Schneider Electric Recommended PROFIBUS cycle time = 1.5 x TTR

- IO Scanning
  Other timing parameters can be changed, as the PRM Watchdog time.



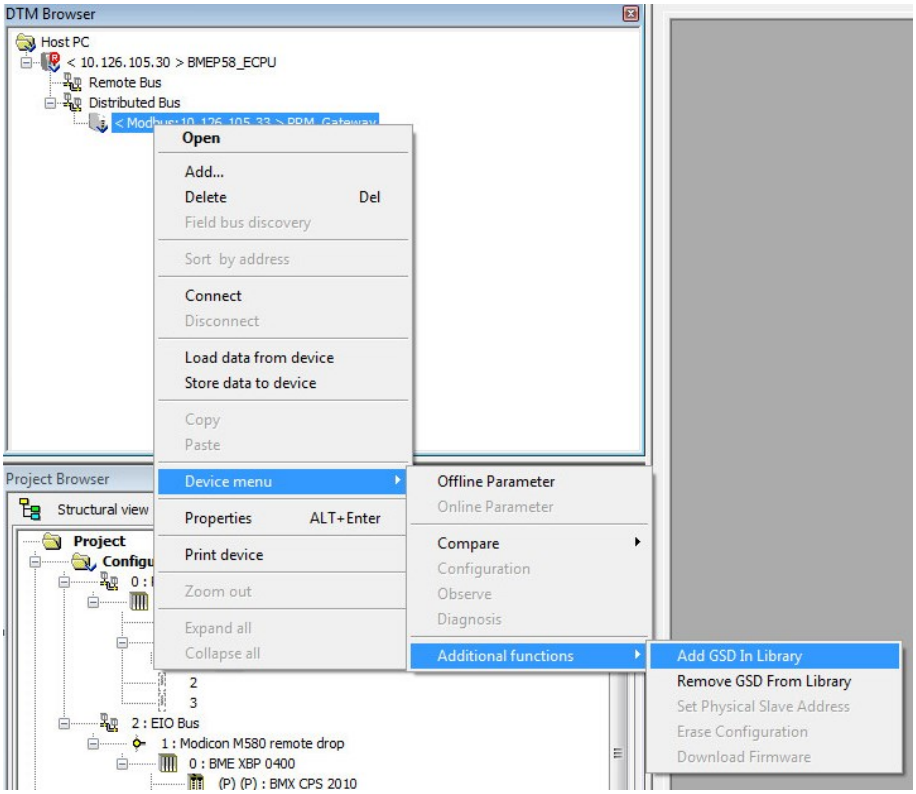
- Save the new settings by clicking on the button “Apply”.



3.2.2 GSD Library

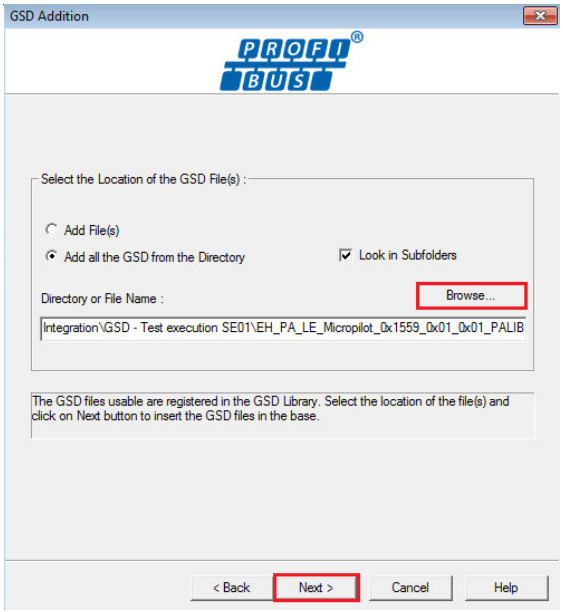
3.2.2.1 GSD files import

- In the DTM browser, right-click on the PRM Gateway DTM and select the menu “Device Menu→Additional functions→Add GSD Library”.

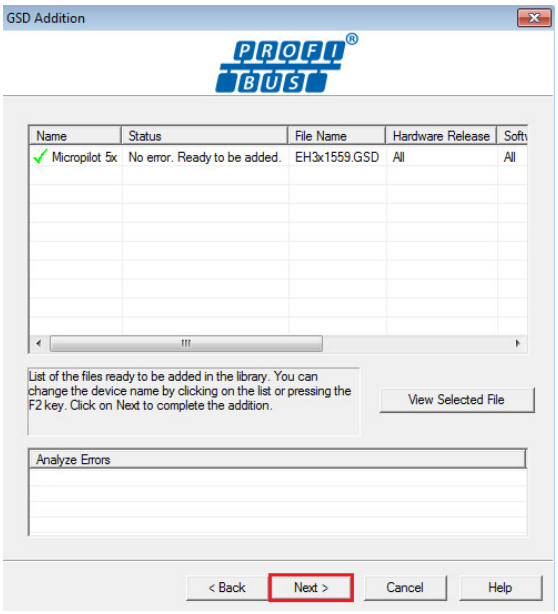


- Click on the button “Next”.

- Select the directory by using the button “Browse” and then click on the button “Next”.

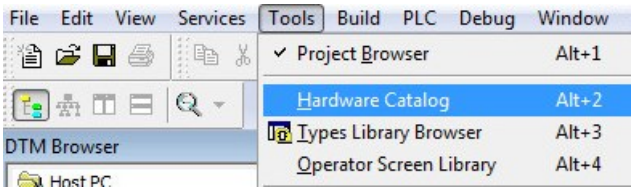


- The Micropilot GSD file is ready to be imported.
  Click on the button “Next”.

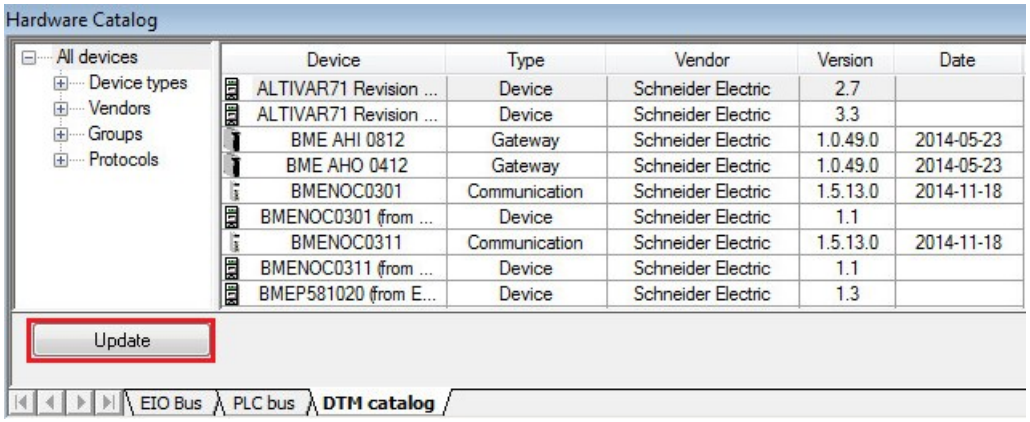


- The import is completed.
  Click on the button “Finish” to close the window.

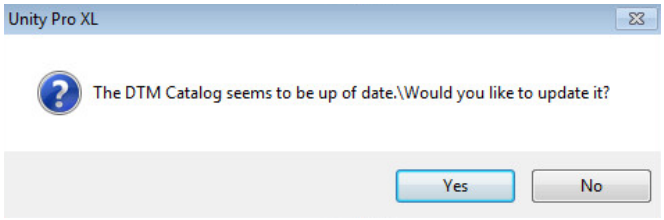
- Open the Hardware Catalog by clicking on the menu “Tools→Hardware Catalog”.



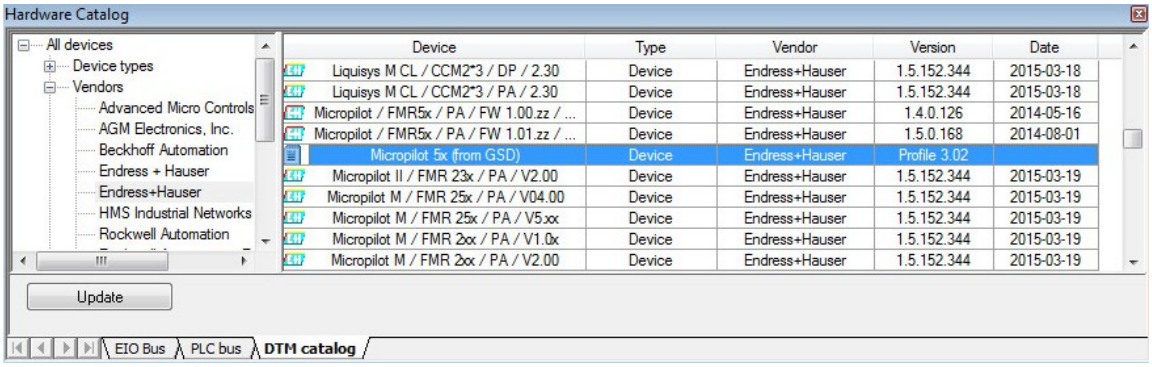
  - Click on the button “Update” to update the DTM catalog database.



  - Following Message Box is displayed.
    Click on the button “Yes”.

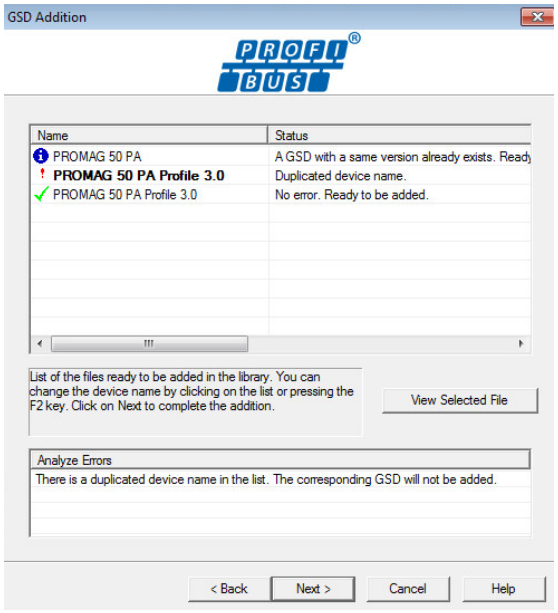


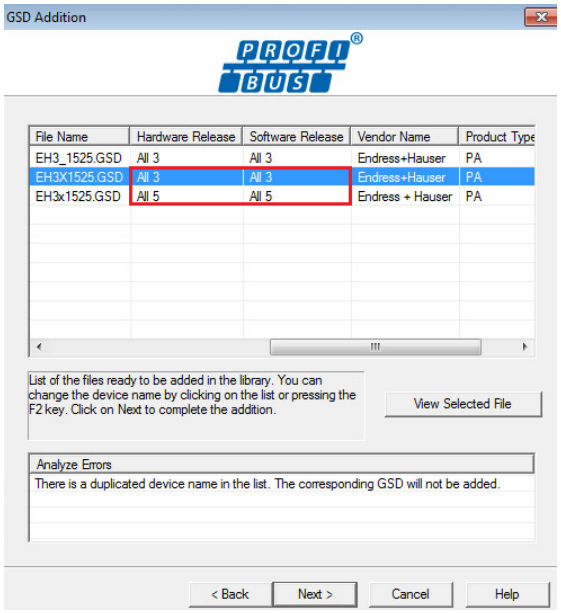
  - Select the Tag “DTM catalog”.
    The Micropilot GSD file is now in the database.



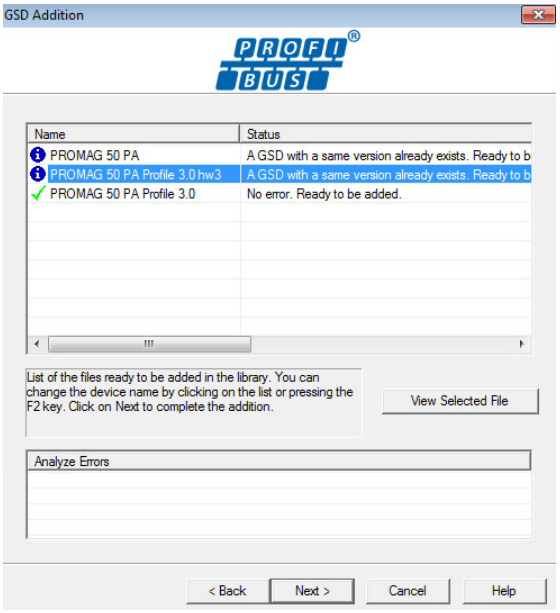
3.2.2.2 GSD revision installation

- Two GSD files cannot have the same name. The name needs to be changed.
  In this example, the target is to implement to GSD files which have the same name but other Hardware Release and Software Release.





- The name of the marked one needs to be changed.



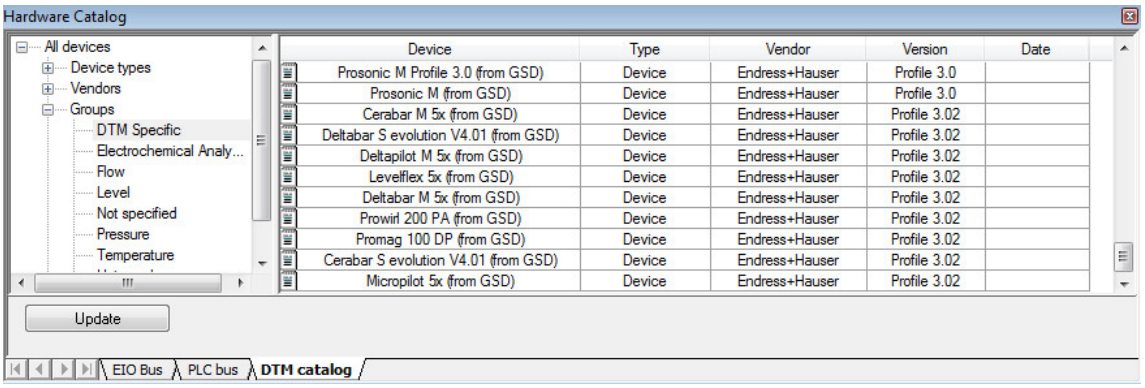
- The two GSD files are located in the Hardware Catalog with 2 different names.

Device	Type	Vendor	Version	Date
PROMAG 50 PA (from GSD)	Device	Endress+Hauser	Profile 3.0	
PROMAG 50 PA Profile 3.0 hw3 (from GSD)	Device	Endress+Hauser	Profile 3.0	

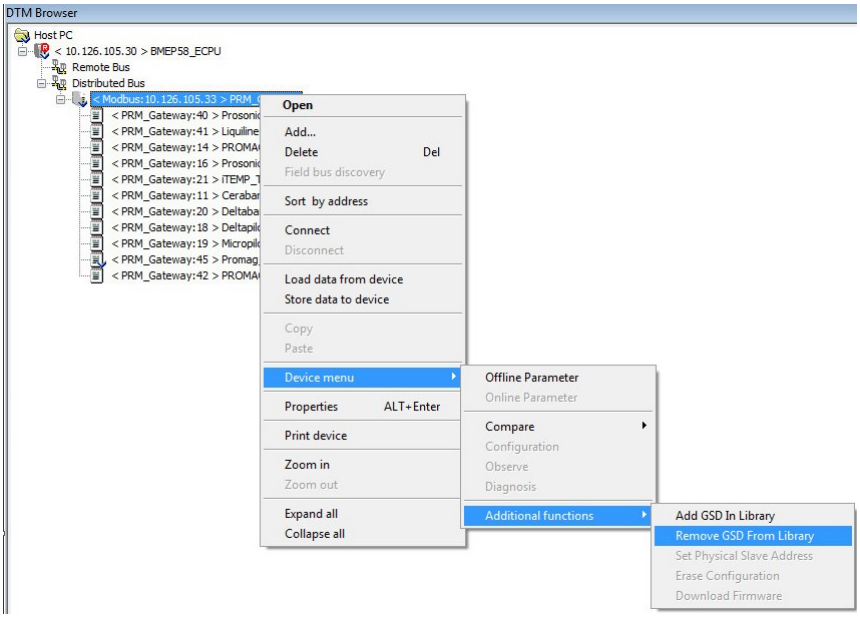
3.2.2.3 GSD family slave structure

- A GSD family slave structure is available in the Hardware Catalog with different sections as Device types, Vendors, Groups and Protocol.

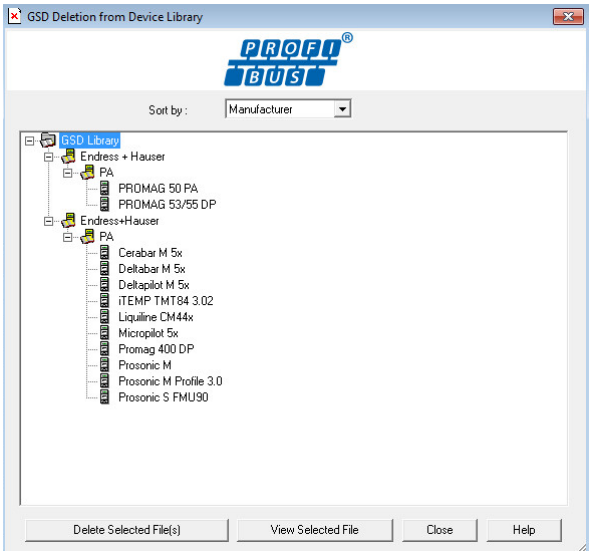
- All GSD drivers are sorted in the section:
  - Device types→Devices.
  - Vendors→Endress+Hauser (2 times).
  - Protocols→Profibus DPV1.
  - Groups→DTM specific.



- Another way to display the GSD files is to right-click on the Gateway DTM and to select the menu "Device menu→Additional functions→Remove GSD From Library".



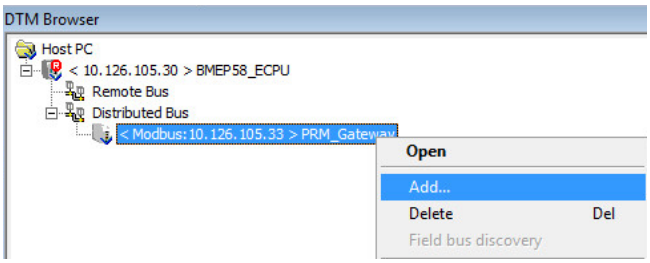
- Installed GSD files can be sorted according to the File Name/Manufacturer/Category/Device Name.



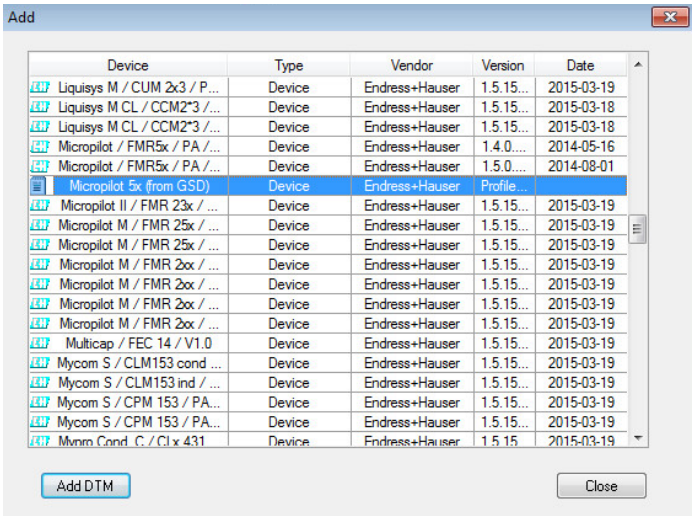
3.2.3 Field Device Configuration with GSD

3.2.3.1 New field device

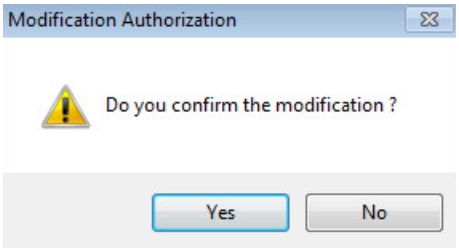
- In the DTM browser, right-click on the PRM Gateway DTM and select the menu “Add”.



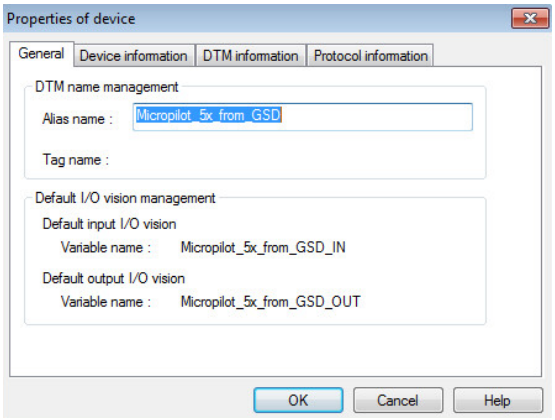
- Select the GSD file “Micropilot 5x” and click on the button “Add DTM”.



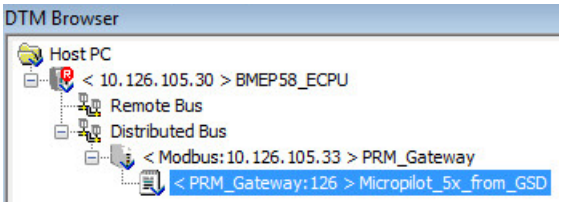
- Confirm the choice by clicking on the button “Yes”.



- Click on the button “OK”.



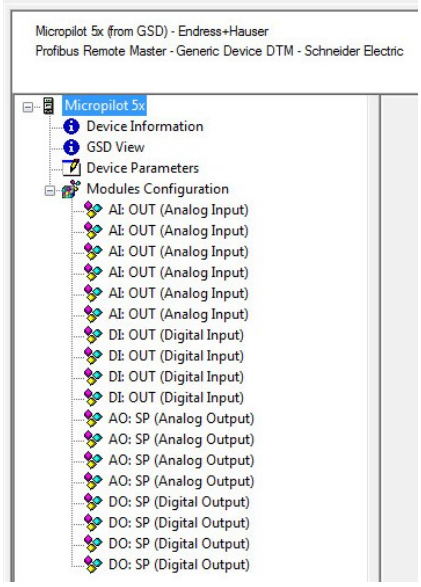
- The Micropilot is inserted in the DTM browser Project structure with the address 126.



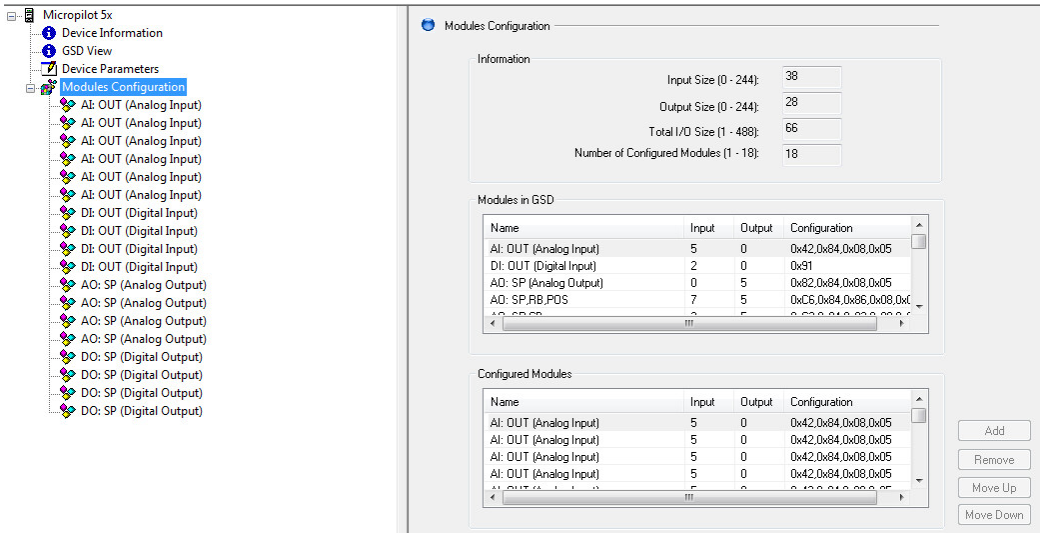
3.2.3.2 IO modules configuration

- Double-click on the generic DTM “Micropilot_5x_from_GSD”.

- This opens the device DTM configuration window.



- Select the menu “Modules Configuration”.
  - The default IO module configuration is already done according to GSD file.



  - Corresponding slot definition in GSD file:
    For each slot, there is at first the default module and then the allowed one.
    For example, for Slot(1):
    - Default module is Module 1.
    - Allowed modules are Module 1 and Module 17.

```
;***************  Additional keywords for module assignment  **************
SlotDefinition
Slot(1)  = "AI 1 (Analog Input)"    1 1,17
Slot(2)  = "AI 2 (Analog Input)"    1 1,17
Slot(3)  = "AI 3 (Analog Input)"    1 1,17
Slot(4)  = "AI 4 (Analog Input)"    1 1,17
Slot(5)  = "AI 5 (Analog Input)"    1 1,17
Slot(6)  = "AI 6 (Analog Input)"    1 1,17
Slot(7)  = "DI 1 (Digital Input)"   2 2,17
Slot(8)  = "DI 2 (Digital Input)"   2 2,17
Slot(9)  = "DI 3 (Digital Input)"   2 2,17
Slot(10) = "DI 4 (Digital Input)"   2 2,17
Slot(11) = "AO 1 (Analog Output)"   3 3,4,5,6,7,8,9,17
Slot(12) = "AO 2 (Analog Output)"   3 3,4,5,6,7,8,9,17
Slot(13) = "AO 3 (Analog Output)"   3 3,4,5,6,7,8,9,17
Slot(14) = "AO 4 (Analog Output)"   3 3,4,5,6,7,8,9,17
Slot(15) = "DO 1 (Digital Output)"  10 10,11,12,13,14,15,16,17
Slot(16) = "DO 2 (Digital Output)"  10 10,11,12,13,14,15,16,17
Slot(17) = "DO 3 (Digital Output)"  10 10,11,12,13,14,15,16,17
Slot(18) = "DO 4 (Digital Output)"  10 10,11,12,13,14,15,16,17
EndSlotDefinition
```

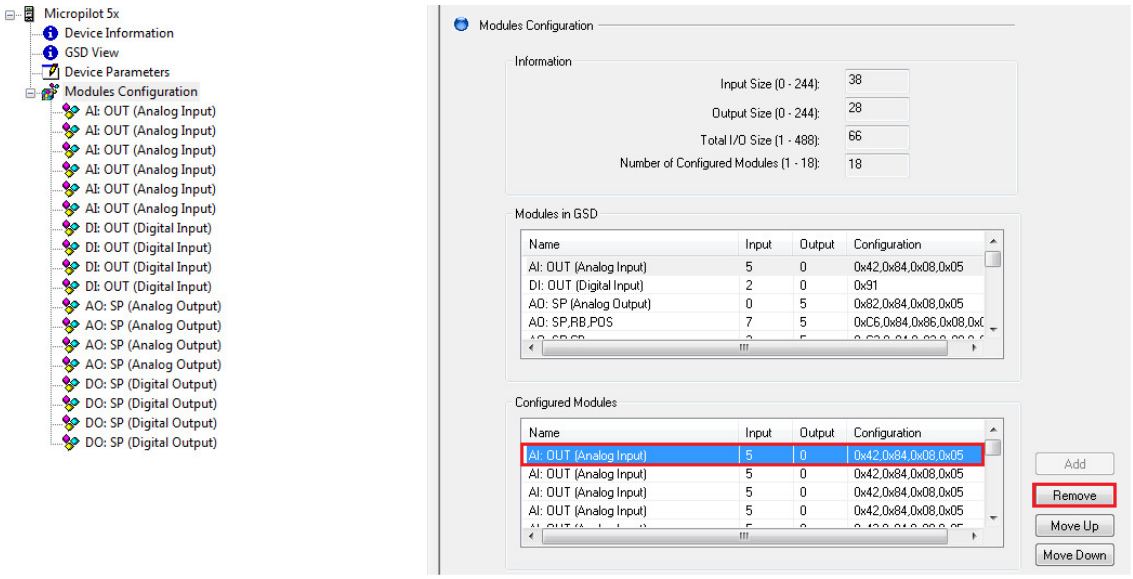
Default modules

- Corresponding modules definition in GSD file

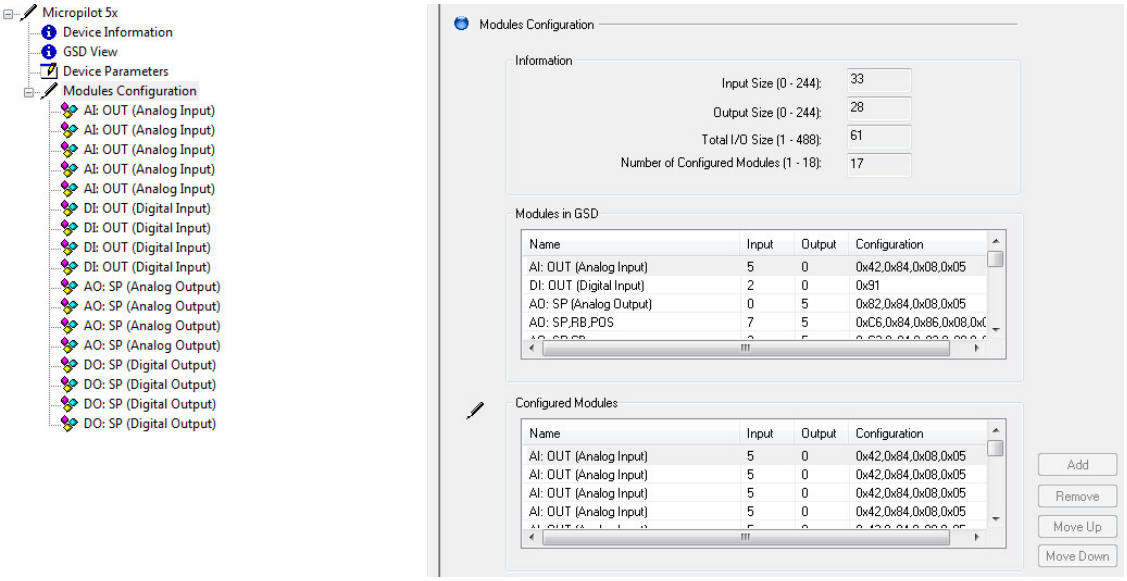
```
Module = "AI: OUT (Analog Input)" 0x42,0x84,0x08,0x05
1
EndModule

Module = "DI: OUT (Digital Input)" 0x91
2
EndModule

Module = "AO: SP (Analog Output)" 0x82,0x84,0x08,0x05
3
EndModule

Module = "AO: SP,RB,POS" 0xC6,0x84,0x86,0x08,0x05,0x08,0x05,0x05,0x05
4
EndModule

Module = "AO: SP,CB" 0xC3,0x84,0x82,0x08,0x05,0x0A
5
EndModule

Module = "AO: SP,RB,POS,CB" 0xC7,0x84,0x89,0x08,0x05,0x08,0x05,0x05,0x05,0x0A
6
EndModule

Module = "AO: RC_IN,RC_OUT" 0xC4,0x84,0x84,0x08,0x05,0x08,0x05
7
EndModule

Module = "AO: RC_IN,RC_OUT,CB" 0xC5,0x84,0x87,0x08,0x05,0x08,0x05,0x0A
8
EndModule

Module = "AO: SP,RB,RC_IN,RC_OUT,POS,CB" 0xCB,0x89,0x8E,0x08,0x05,0x08,0x05,0x08,0x05,0x08,0x05,0x05,0x05,0x0A
9
EndModule

Module = "DO: SP (Digital Output)" 0xA1
10
EndModule

Module = "DO: SP,RB" 0xC1,0x81,0x81,0x83
11
EndModule

Module = "DO: SP,CB" 0xC1,0x81,0x82,0x92
12
EndModule

Module = "DO: SP,RB,CB" 0xC1,0x81,0x84,0x93
13
EndModule

Module = "DO: RC_IN,RC_OUT" 0xC1,0x81,0x81,0x8C
14
EndModule

Module = "DO: RC_IN,RC_OUT,CB" 0xC1,0x81,0x84,0x9C
15
EndModule

Module = "DO: SP,RB,RC_IN,RC_OUT,CB" 0xC1,0x83,0x86,0x9F
16
EndModule

Module = "Free Place" 0x00
17
EndModule
```

- This default IO module configuration can be changed.
  In the following example, the module 1 “AI” of Slot 1 is replaced by the module 17 “Free place”, according to the GSD IO module definition.

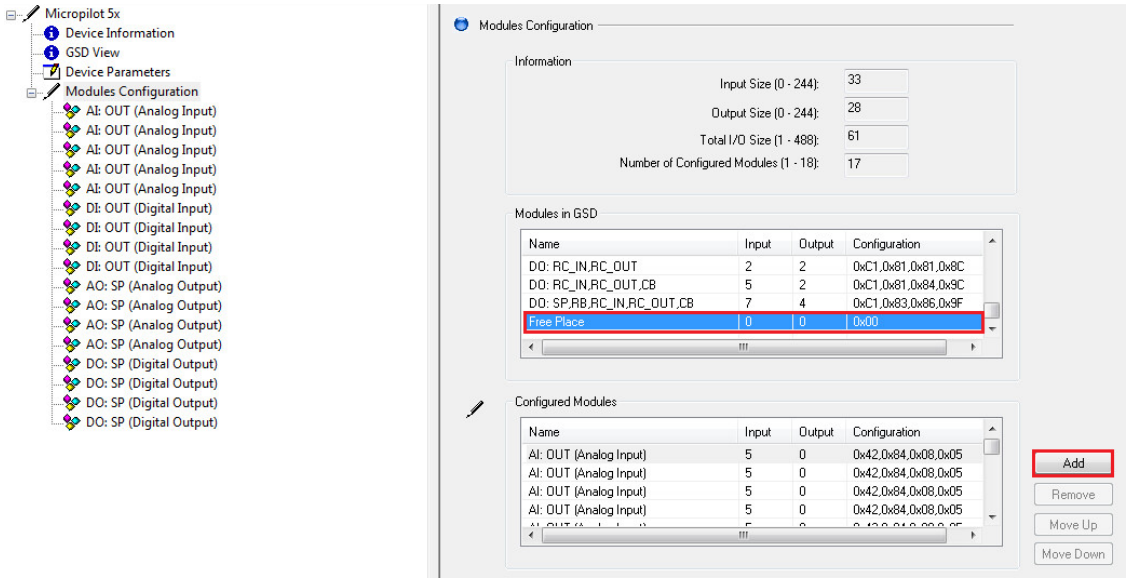
  - Select the module “AI” and click on the button “Remove”.



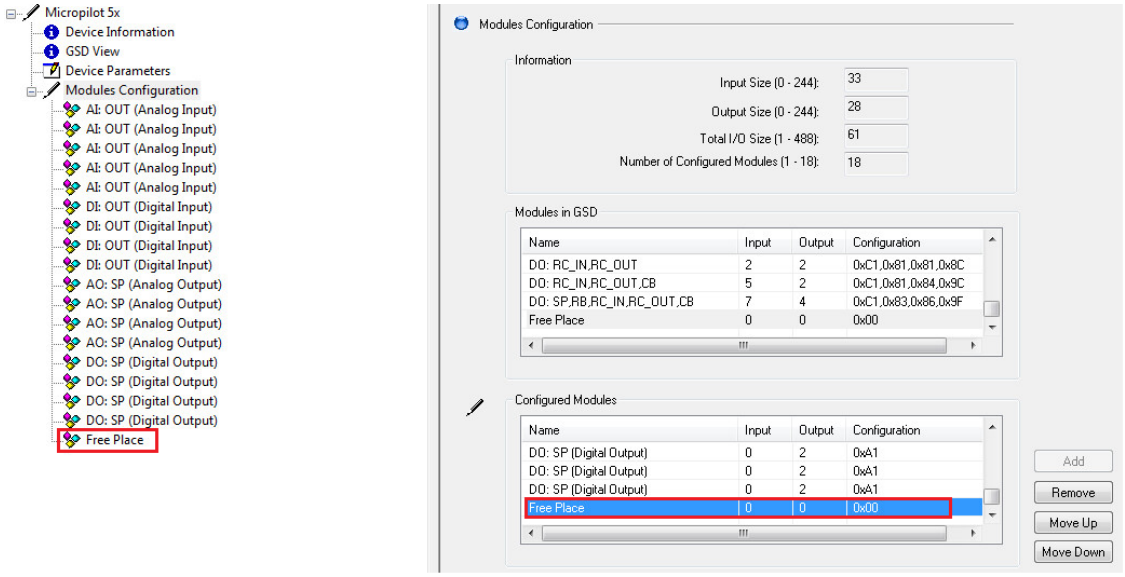
  - The module “AI” of slot 1 is deleted.



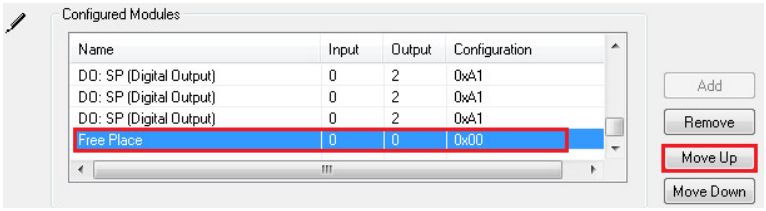
- Select the module “Free place” and click on the button “Add”.



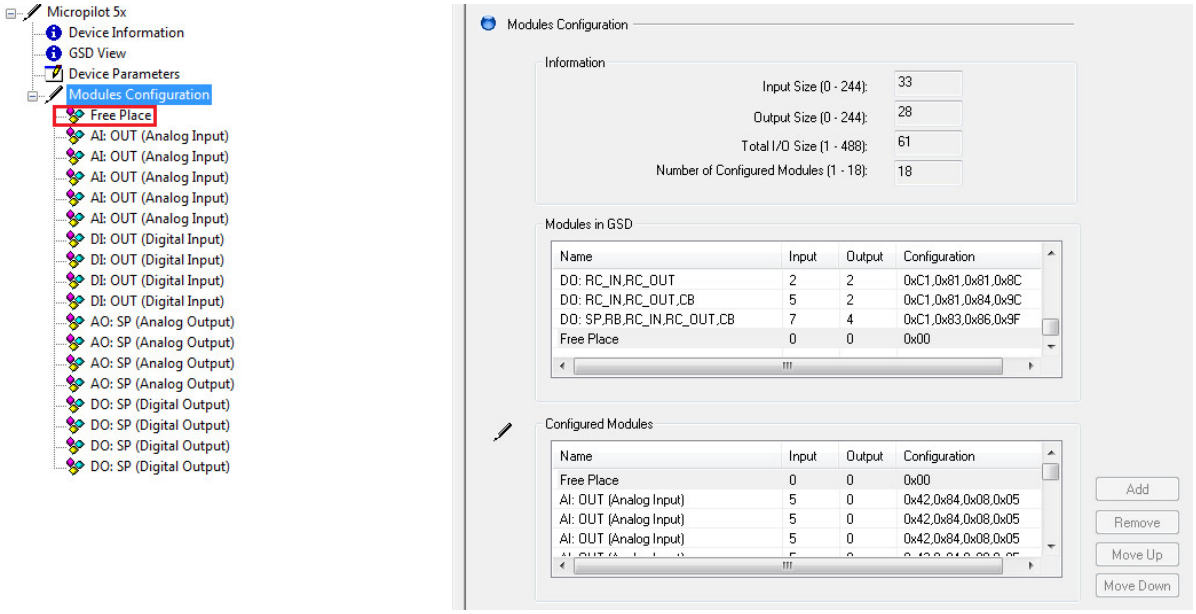
- The module “Free place” is added in the configuration but still not on the right slot.



- Select the module “Free place” and click on the button “Move Up” to move the module to the correct slot.



- The module “Free place” is now on the right slot.

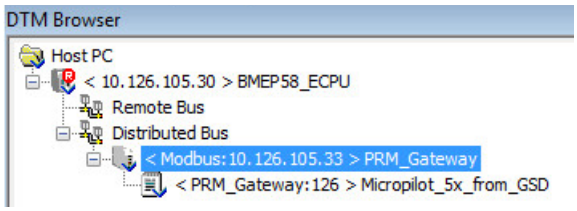


- Save the configuration by clicking on the button “Apply”.

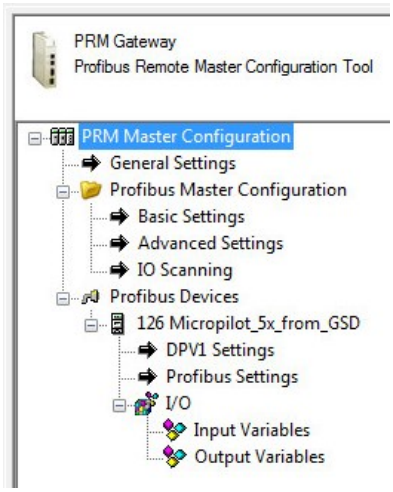
➔ For the next steps, the IO module configuration is the set to the **default** one.

3.2.3.3 Field Device settings

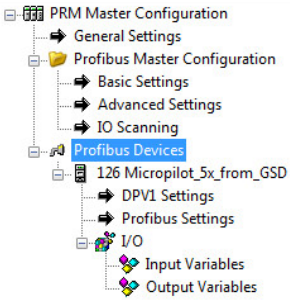
- Double-click on the PRM_Gateway DTM.

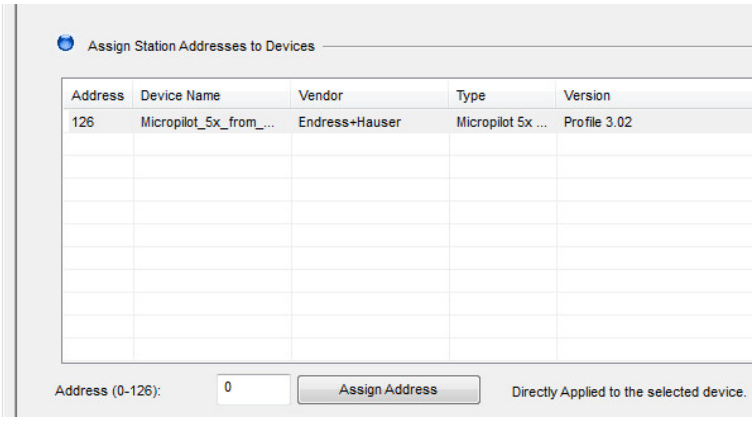


- The menu “Profibus Devices” is now available in the PRM Master Configuration view.

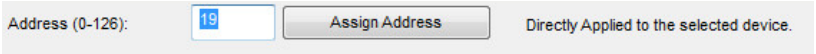


- **PROFIBUS address**
  Select the menu “Profibus Devices”.

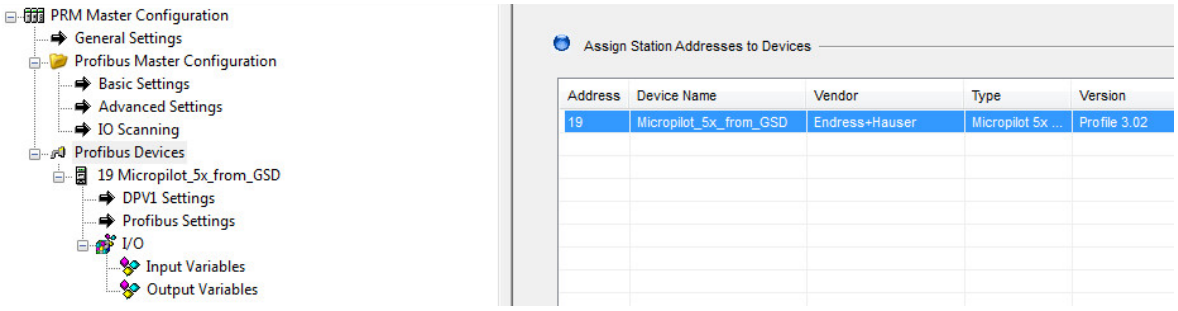




  - Give the new PROFIBUS address and click on the button “Assign Address”.
    In this example, the new PROFIBUS address is 19.

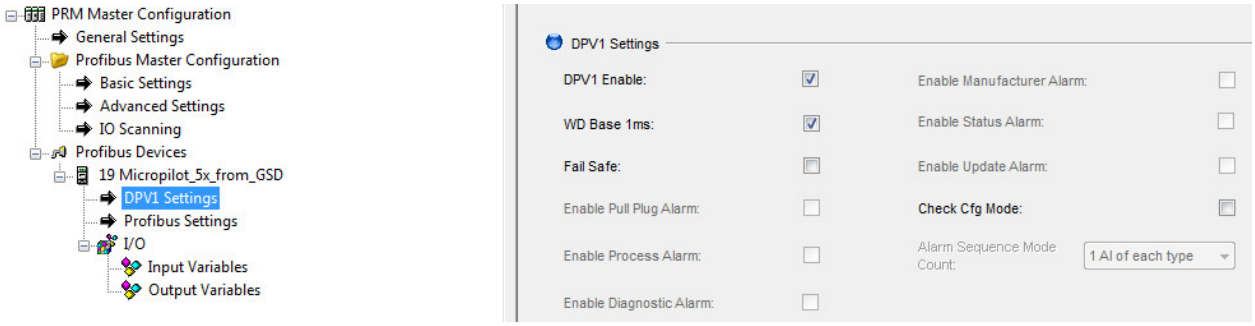


  - New PROFIBUS slave address is updated.

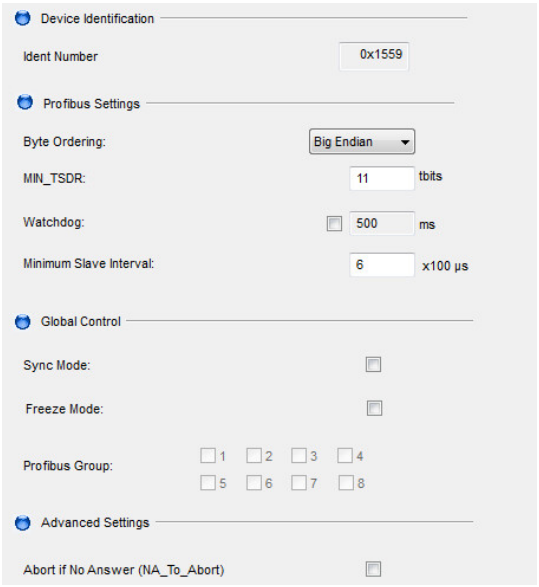


- **DPV1 Settings**

  Select the menu “DPV1 Settings” and update the parameters if needed.

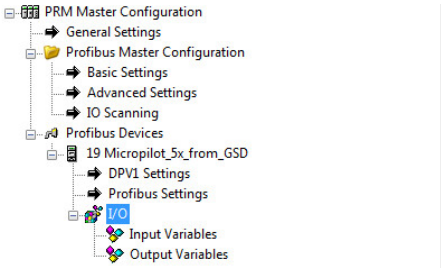


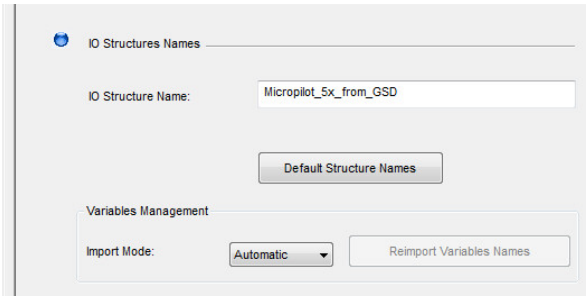
- **PROFIBUS Settings**
  - The parameters “Profibus Settings” are configured automatically according to the GSD file.



- **IO modules data structure configuration**
  The following part explains how to configure the device data structure, which is used in the logic. This data structure is linked to the IO module configuration done in the generic DTM.

  - IO Structure Names.
    The IO Structure Name is used to access to the data in the logic.

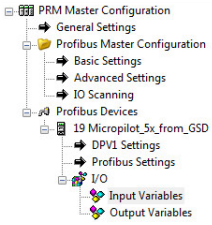


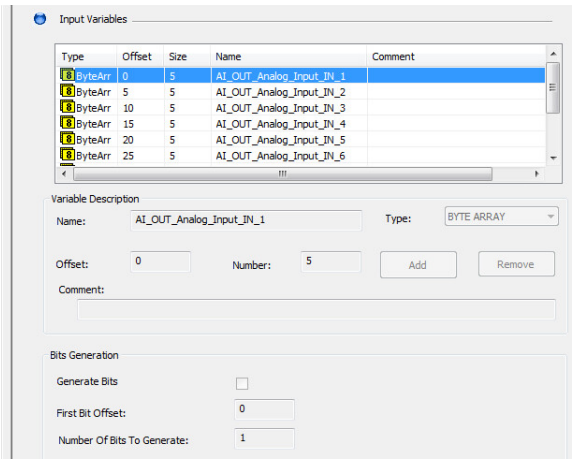


    - The IO Structure Name can be edited. By clicking on the button “Default Structure Names”, the default IO Structure Name is written.
    - The option “Import Mode” allows the user to change the variable type of the allocated IO modules. This option is default configured with “Automatic”. The Automatic mode configures all variables with the type **Byte Array**.

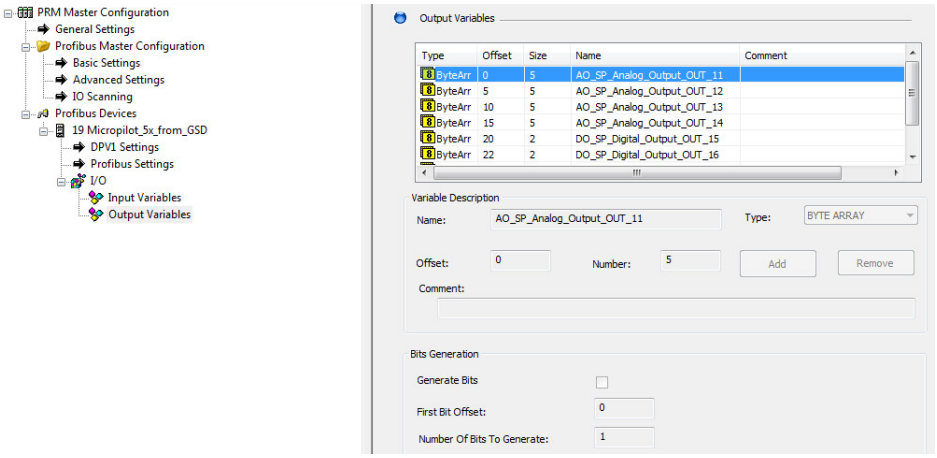
  - IO modules configured in **Automatic mode**.
    All IO modules are configured automatically according to the defined IO module configuration in the device DTM.

    - Input variables



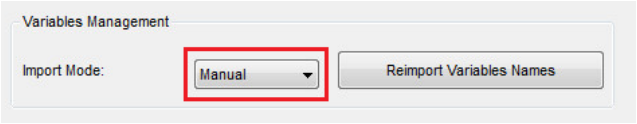


- Output variables

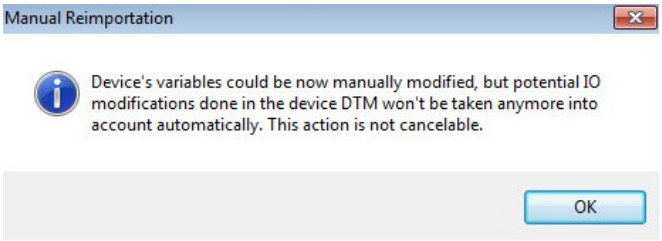


- IO modules configured in **Manual mode**.
  The following example explains how to configure an analog input value variable structure and its status.

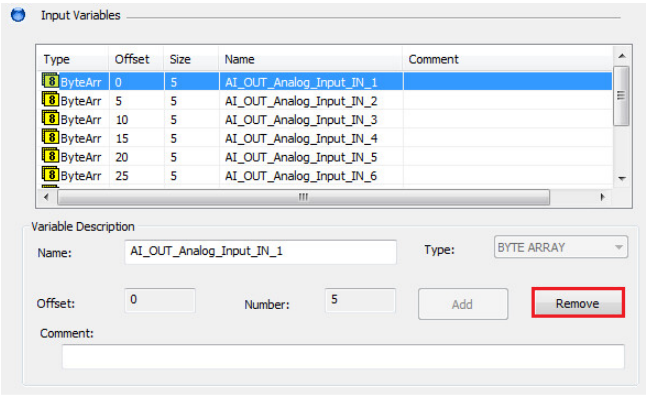
  - Select the “Manual” mode in the IO Structure Names part.



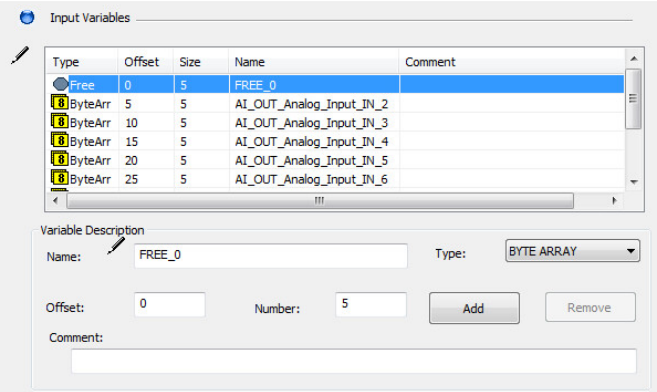
  - Following Message Box is displayed. Click on the button OK.



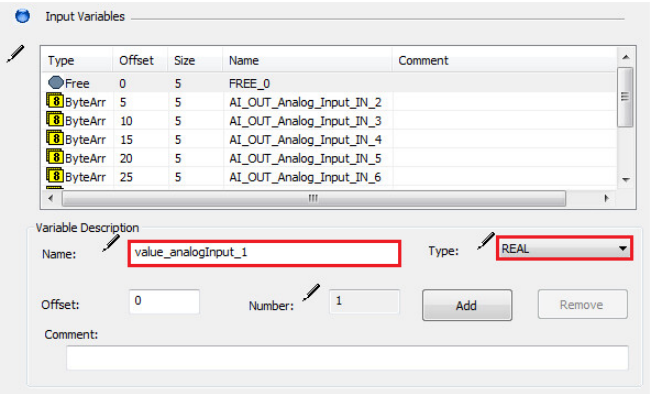
  - In the Input variables view, the button “Remove” is now enabled.
    Select the requested variable and click on the button “Remove”.



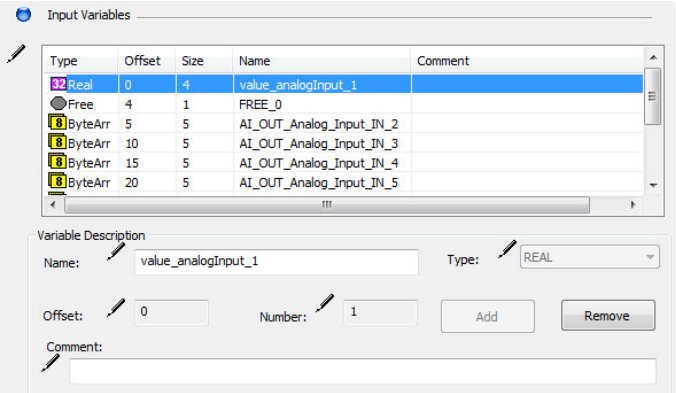
- The variable “AI_OUT_Analog_Input_IN_1” is deleted and replaced by a free module, whose size is 5 bytes.



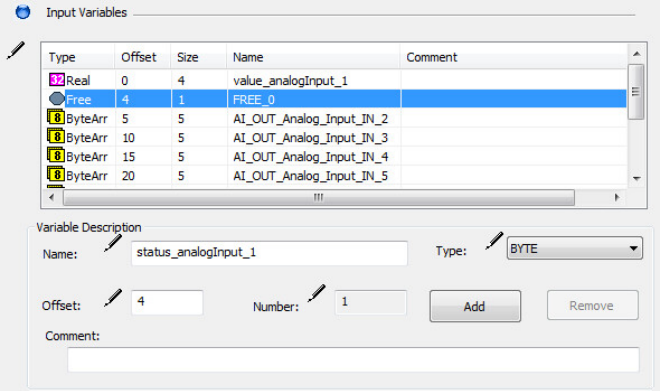
- Enter a new variable name and select the correct type. In this example, the new name is “value_analogInput_1” and its type is REAL.
  Click on the button “Add” to validate.



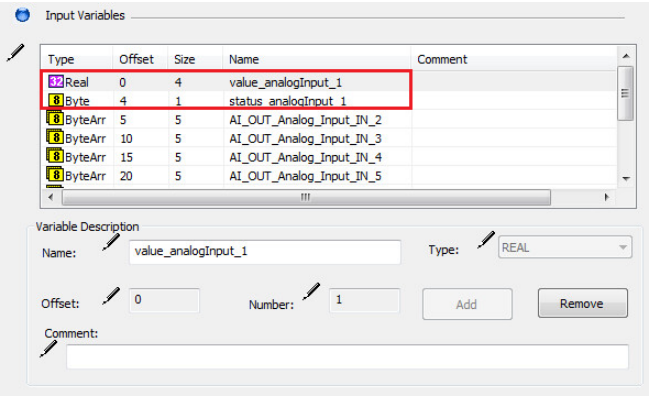
- The new REAL variable “value_analogInput_1” is added.
  The REAL value is made of 4 bytes. That means 1 byte is still free. This will be used for the status.



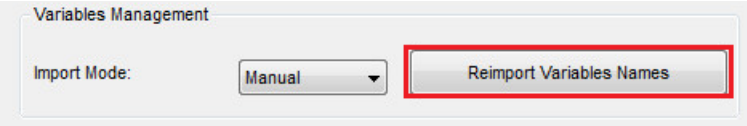
- Select the module “FREE_0”.
  Enter a new variable name and select the correct type. In this example, the new name is “status_analogInput_1” and its type is BYTE.
  Click on the button “Add” to validate.



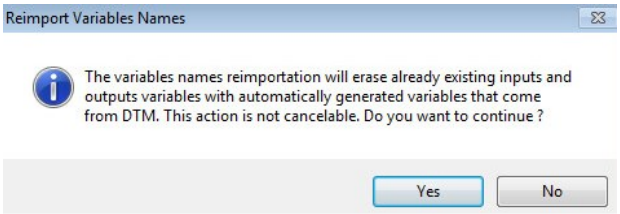
- The analog value with its status is configured.



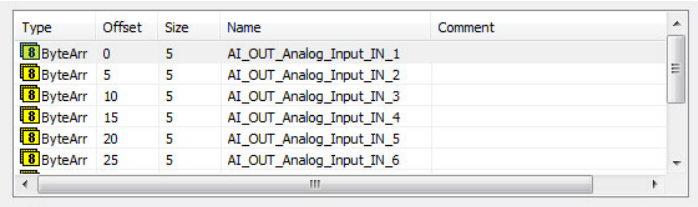
- Reimport Variables names
  - The default variable configuration can be imported by clicking on the button “Reimport Variables Names”.



  - Click on the button “Yes” to validate.

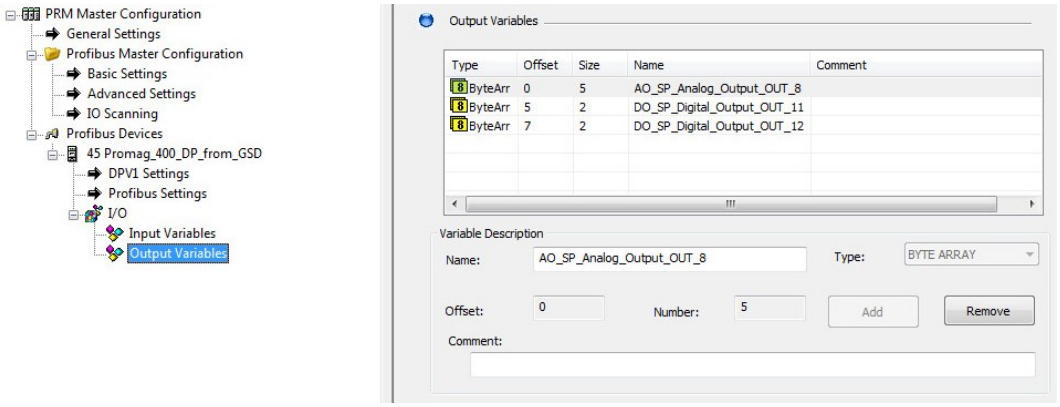


- Input variables have again their default type.



Type	Offset	Size	Name	Comment
ByteArr	0	5	AI_OUT_Analog_Input_IN_1	
ByteArr	5	5	AI_OUT_Analog_Input_IN_2	
ByteArr	10	5	AI_OUT_Analog_Input_IN_3	
ByteArr	15	5	AI_OUT_Analog_Input_IN_4	
ByteArr	20	5	AI_OUT_Analog_Input_IN_5	
ByteArr	25	5	AI_OUT_Analog_Input_IN_6	

  - The same principle is used to configure the **Output variables**.



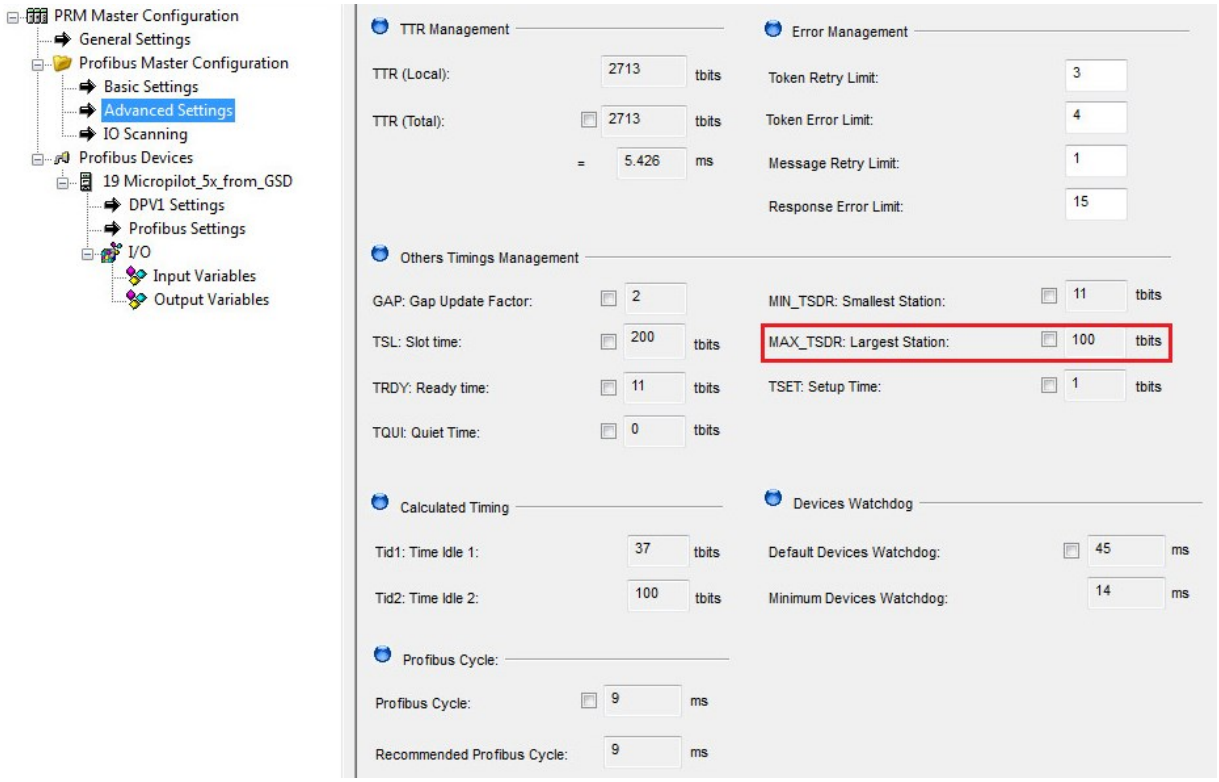
- Save the changes by clicking on the button “Apply”.

- For the next steps, analog inputs and analog outputs have been configured according the Endress+Hauser format, ie 4 bytes and 1 byte Status (as described in the previous example).

3.2.4 PROFIBUS Timing parameters verification

3.2.4.1 Parameter MAX_TSDR

- Select the menu “Advanced Settings”
  Check the parameter “MAX_TSDR : Largest Station” according the configured Baudrate. This parameter can be found in the GSD file.



Remark:

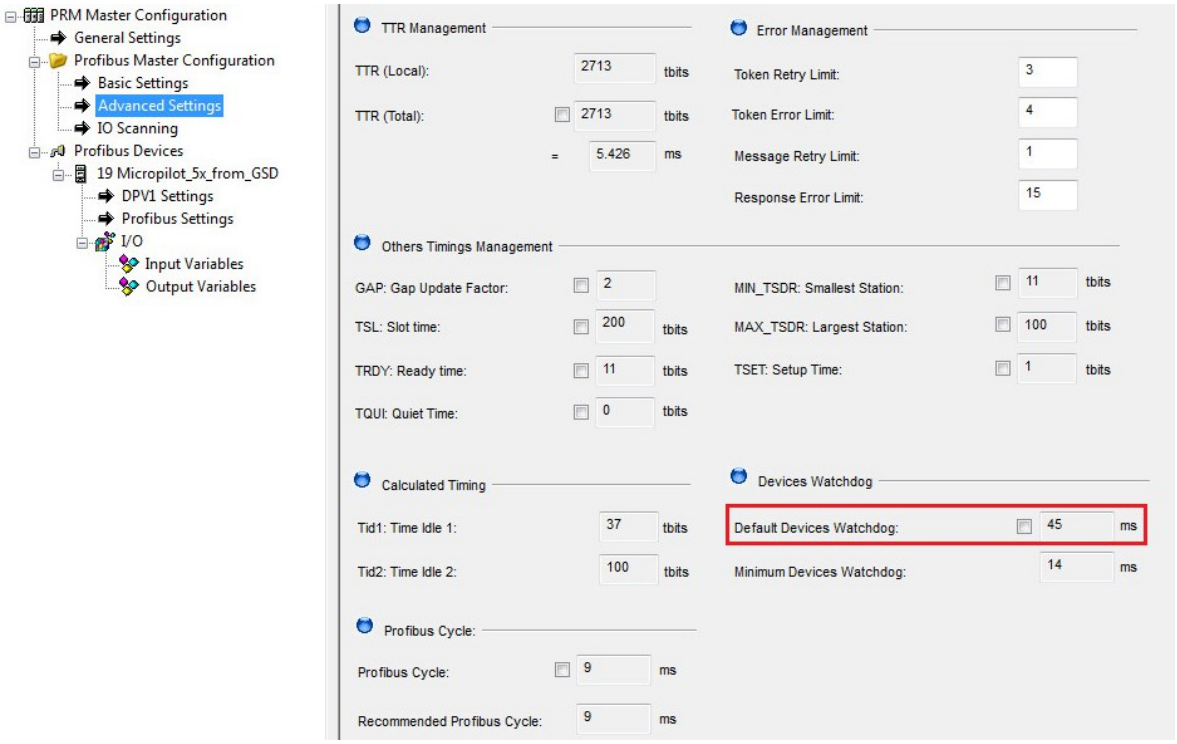
When several field devices are configured in a network, the MAX_TSDR parameter corresponds to the highest value of these field devices.

3.2.4.2 Parameter Default Devices Watchdog

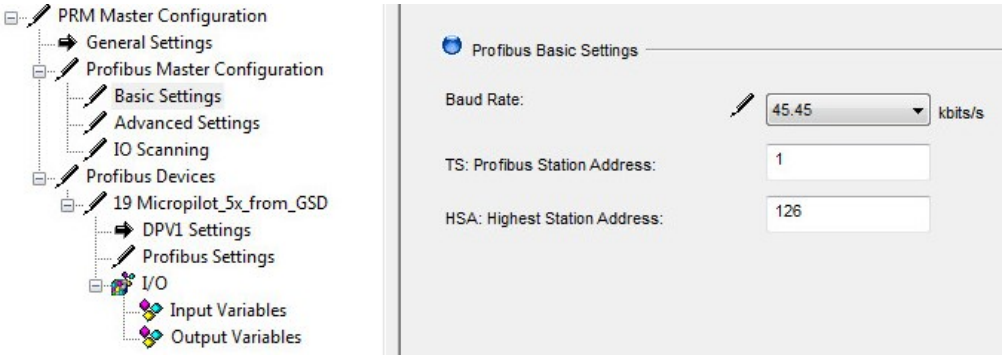
By use of Profibus PA field devices, Schneider Electric recommends to adapt the calculated parameter “Default Devices Watchdog”.

Steps to follow :

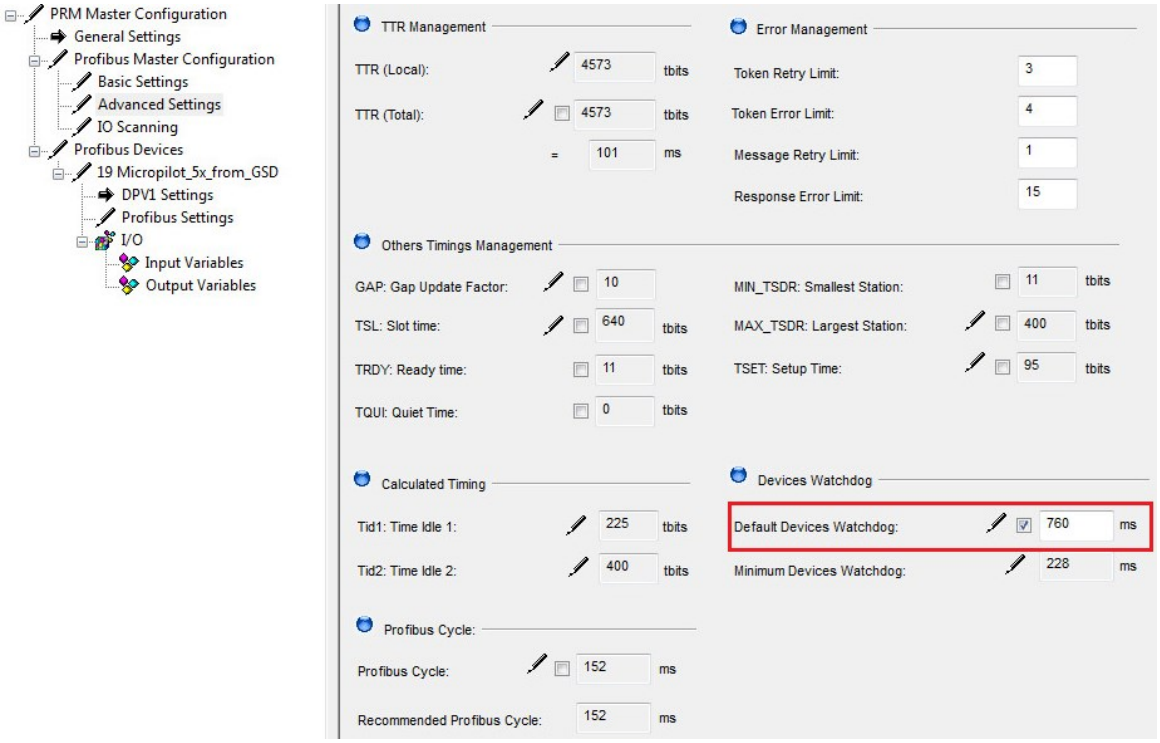
- In the “Basic Settings” configuration, the Baudrate has been set to 500 kBaud.
  This configures automatically the parameter “Default Devices Watchdog” to 45ms.



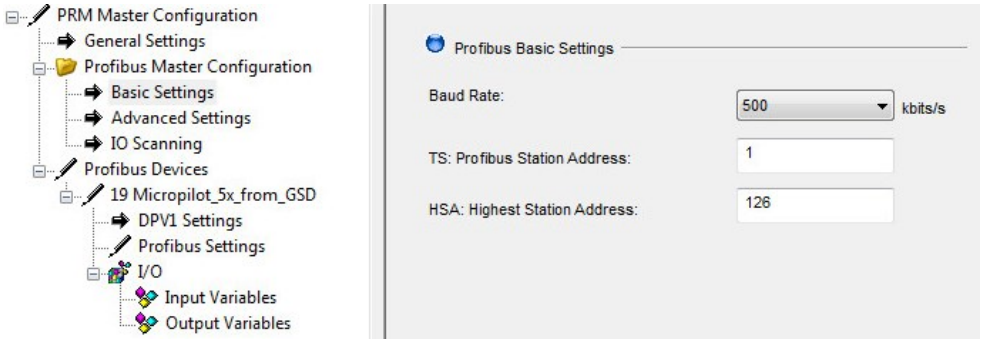
- Schneider Electric recommends setting this parameter to the calculated value of 45.45kBaud. In the menu “Basic Settings”, select the Baudrate 45.45kBaud.



- Select the menu “Advanced Settings”.
  Crosscheck the calculated Baudrate.



- Go back to the menu “Basic Settings” and select the Baudrate 500kBaud.



- Save the changes by clicking on the button “Apply”.

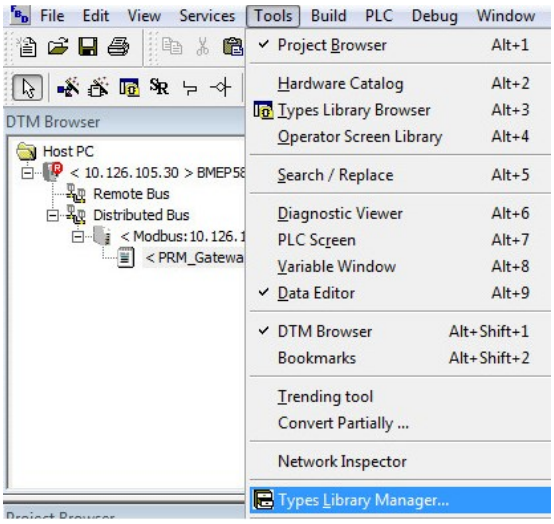
➔ The parameter “Default Devices Watchdog” has now the value 760ms at 500kBaud.

3.3 Mapping of Process Values and Status to Control Strategy

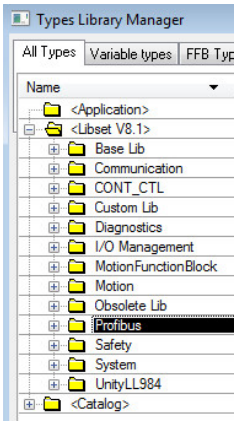
3.3.1 PRM Library

The installation of the library “PRM library V1.0” is required in order to start the PRM. This library can be found on the PROFIBUS Remote Master CD-ROM.

- Click on the menu “Tools→Types Library Manager…”.

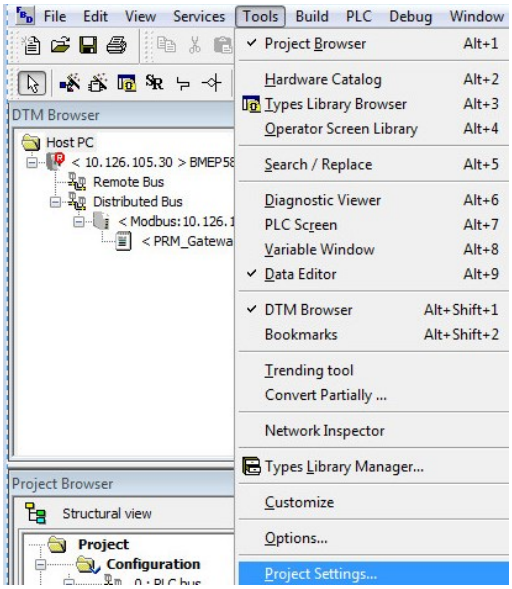


- Open the library “Libset V8.1” and check if the library “Profibus” is installed.

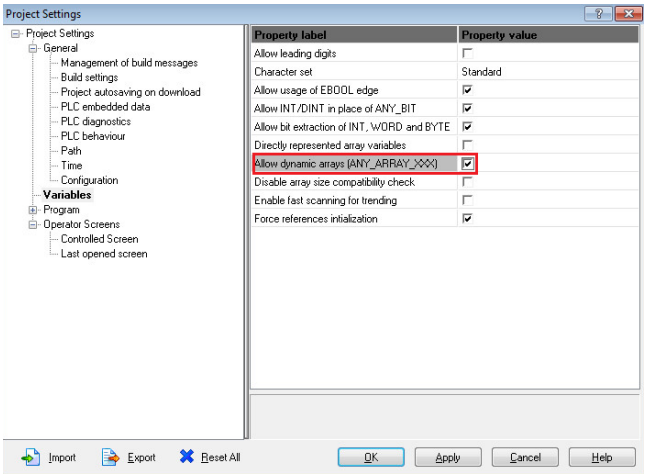


3.3.2 Project compilation

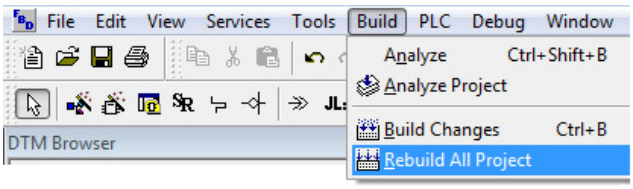
- Click on the menu “Tools→Project Settings”.



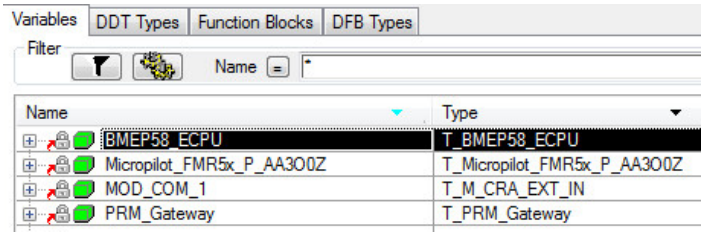
- Select the option “Allow dynamic arrays”.



- Compile the project by clicking on the menu “Build→Rebuild All Project”.



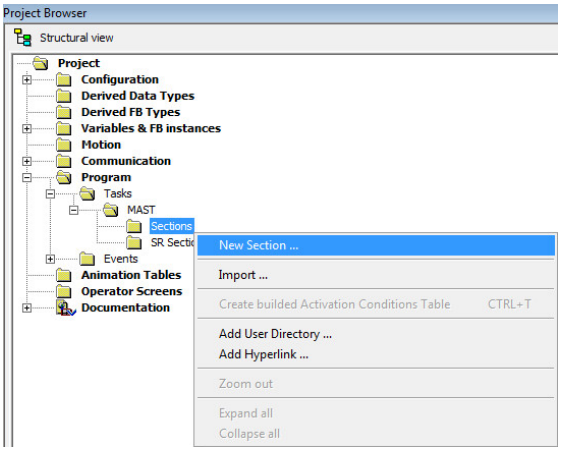
- Once the project compiled, the DTMs used in the DTM browser view have their structure added in the ”variables. (Variables & FB instances menu)



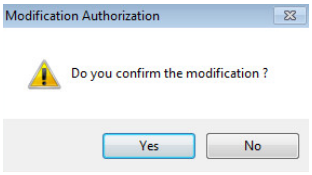
3.3.3 PRM Function block configuration

3.3.3.1 PRM Function block import

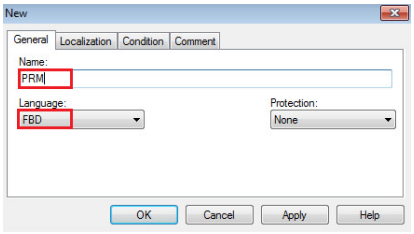
- In the Project Browser view, create a new section by clicking on the menu “Program→Tasks→MAST→Sections”.



- Following message box is displayed. Click on the button “Yes” to continue.

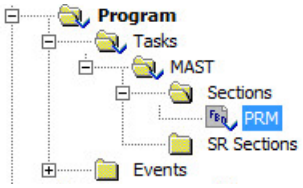


- Enter a section name and choose a language.

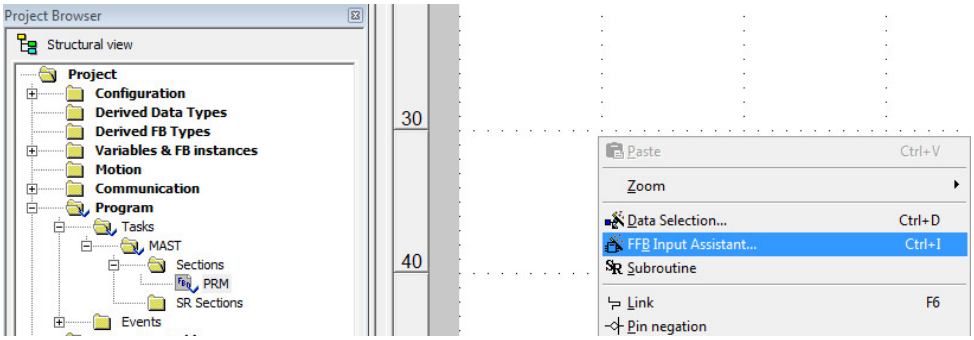


  - In this example, the section name is “PRM” and the language is “FBD”.
  - Click on the button “OK” to continue.

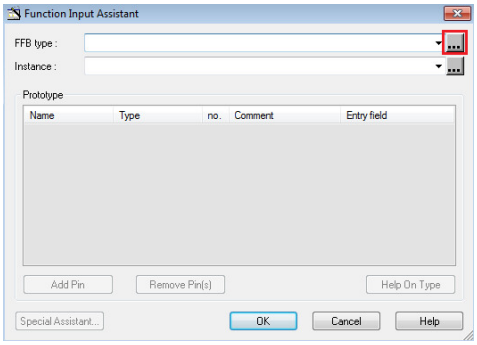
- The new section is added in the Project Browser.



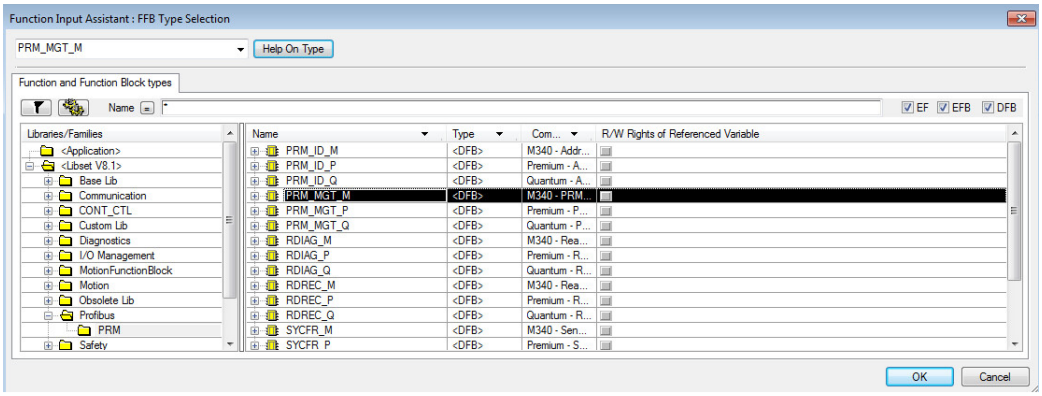
- Right-click in the program window and select the menu “FFB Input Assistant...”.



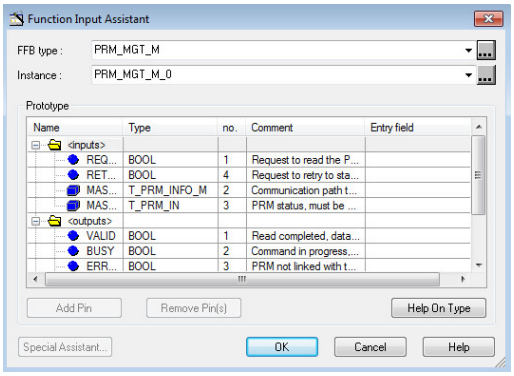
- The window Function Input Assistant is displayed.
  Click on the button “...”.



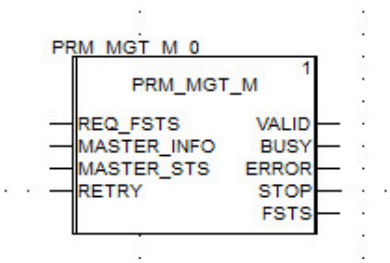
- Select the function block “PRM_MGT_M” and click on the button “OK”.



- The Function Input Assistant displays the chosen function block. Click on the button “OK” to continue.



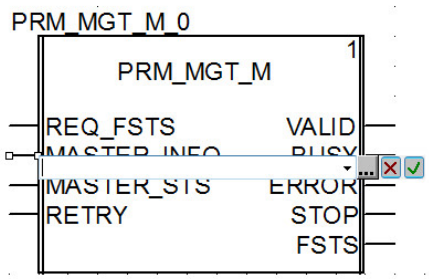
- Left-click in the program window. This will import the function block.



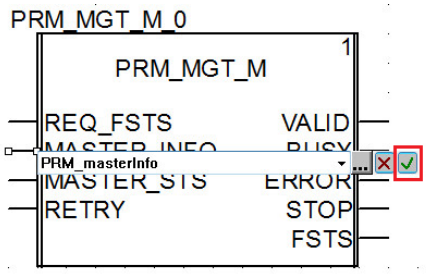
3.3.3.2 PRM Function Block mandatory variables assignment

The structures “MASTER_INFO” and “MASTER_STS” must be assigned in order to get cyclic communication between the PRM Gateway and the devices.

- **MASTER_INFO** structure
  - Double-click on the “MASTER_INFO” variable.
    The edit bar is displayed on the function block.

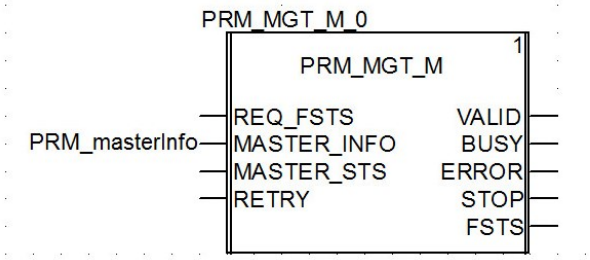


  - Create the variable structure “PRM_masterInfo” and click on the green check box.

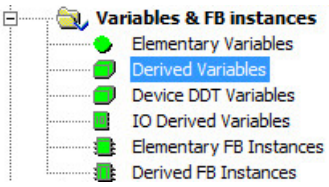


  - Confirmation window is displayed. Click on the green check box.

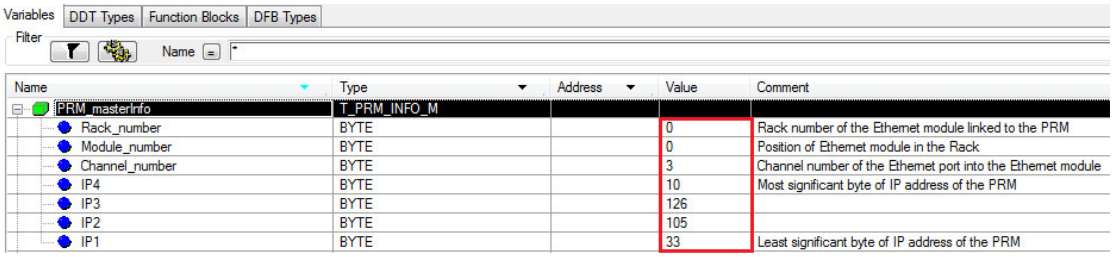
  - The structure “PRM_masterInfo” is assigned to the PRM function block.



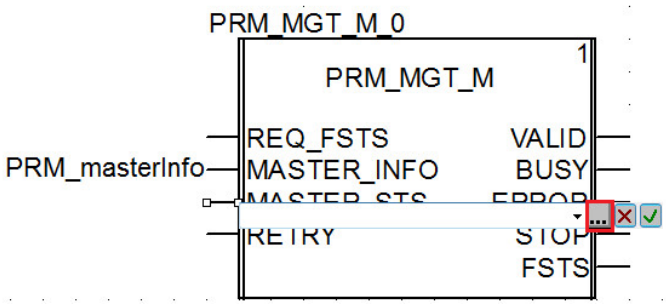
- The structure “PRM_masterInfo“ must be initialized.
  In the Project Browser, click on the menu “Variables & FB instances→Derived variables”.



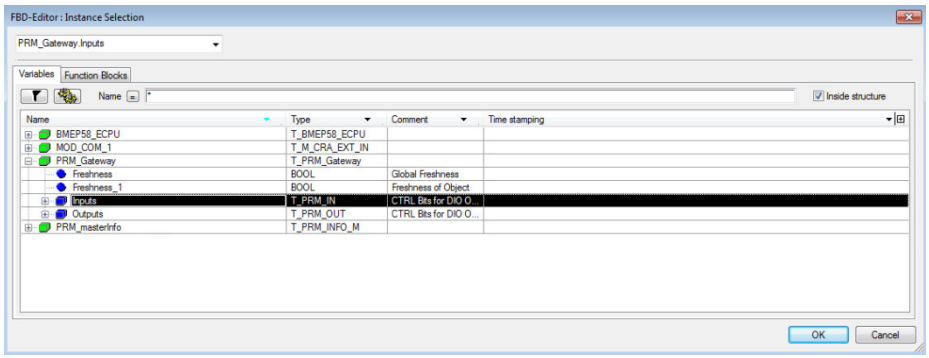
- The structure “PRM_masterInfo” is displayed.
  Configure all attributes according to the network configuration.



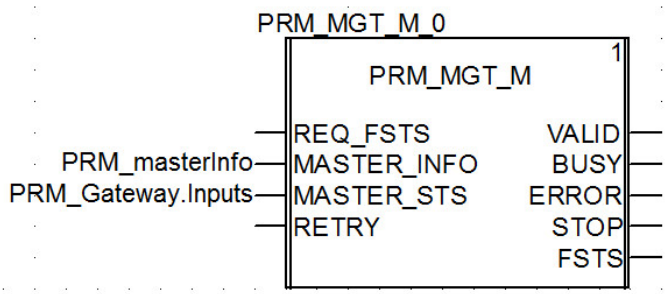
- **MASTER_STS** structure
  - Double-click on the MASTER_STS variable.
    The edit bar is displayed on the function block. Click on the button “…”.



- Assign the attribute “Inputs” of the structure “PRM_Gateway” and click on the button “OK” to close the windows. This structure has been created automatically when the DTM has been inserted in the DTM project.

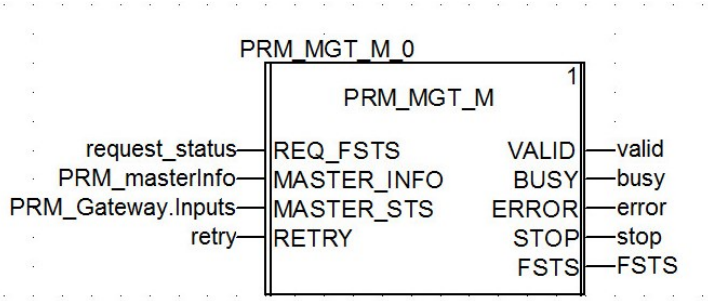


- Assigned variables.



3.3.3.3 PRM Function Block optional variables assignment

- The other variables can be assigned following the same steps as for the **MASTER_INFO** structure (see previous chapter).

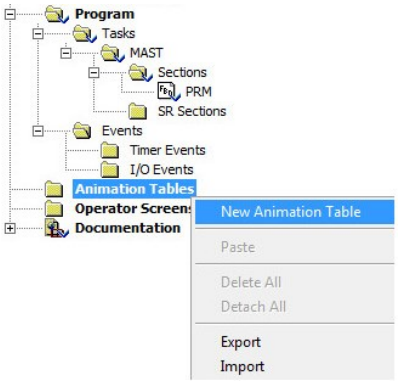


3.3.4 Animation tables configuration

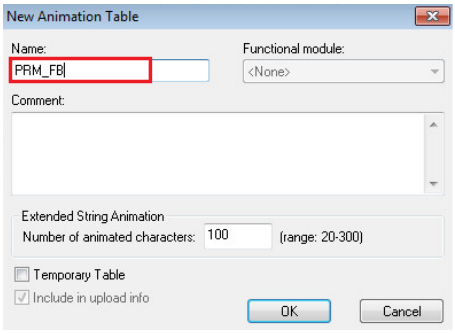
Animation tables are used to display variables values in online mode. The following part explains how to configure one animation for the PRM function block and one for the PRODFIBUS devices.

3.3.4.1 Animation table PRM_FB

- In the Project Browser, right-click on the menu “Animation Tables” and select the menu “New Animation Table”.

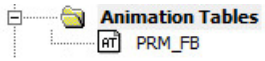


- Enter a name for the animation table and click on the button “OK”.

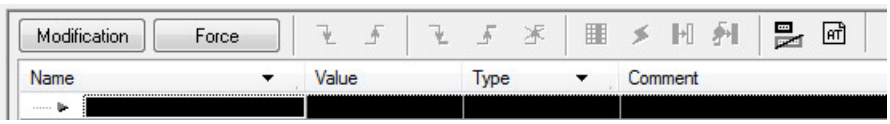


PRM

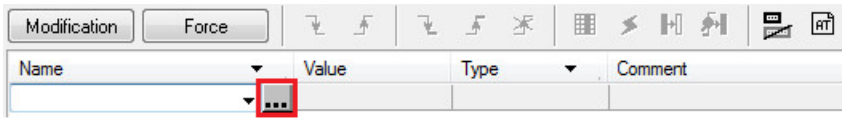
- The created animation table is added in the Project Browser.



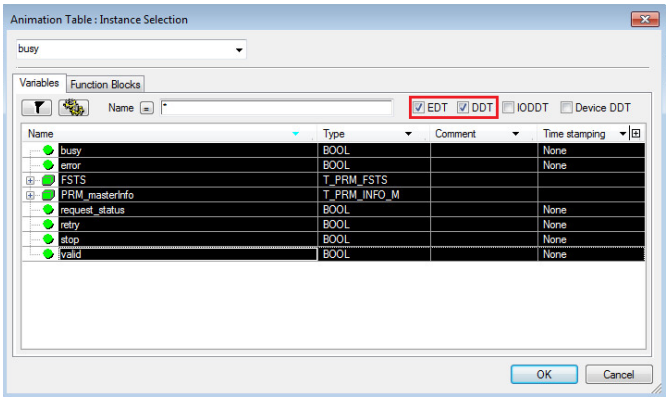
- Double-click on the animation table “PRM_FB”.
  Following window is displayed.



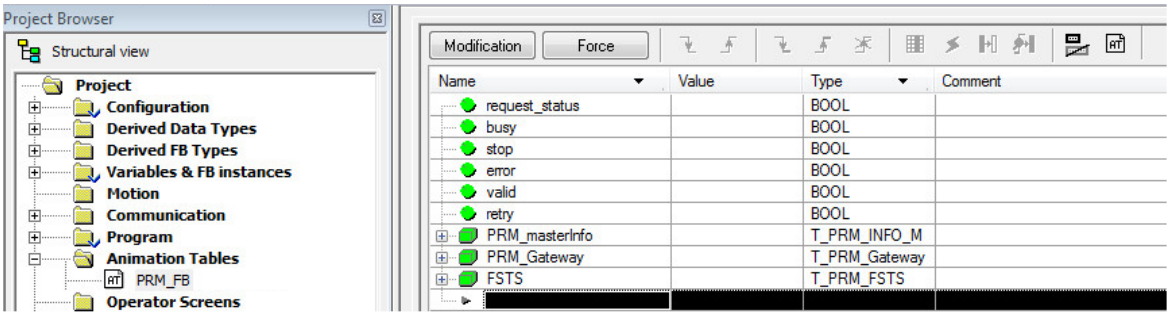
- Double-click in the field “Name “in order to display the button “...”.



- Select the variables of the PRM function block and click on the button “OK”.

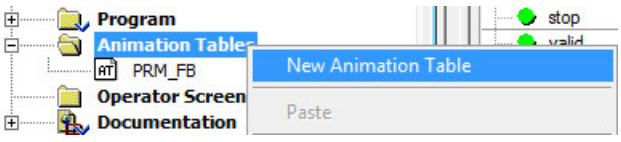


- Selected variables are added in the animation table.

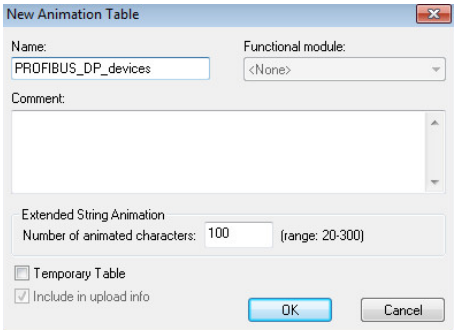


3.3.4.2 Animation table PROFIBUS_DP_devices

- In the Project Browser, right-click on the menu “Animation Tables” and select the menu “New Animation Table”.

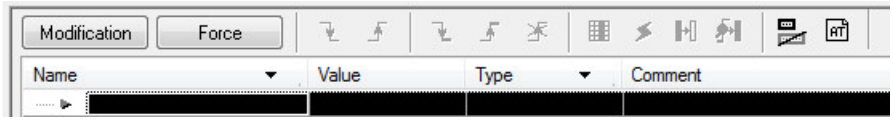


- Enter a name for the animation table and click on the button “OK”.

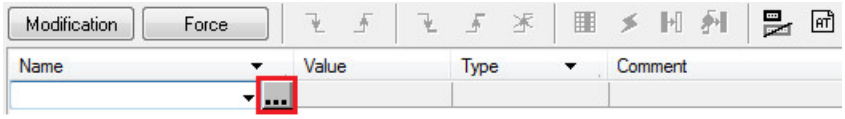


- The created animation table is added in the Project Browser.

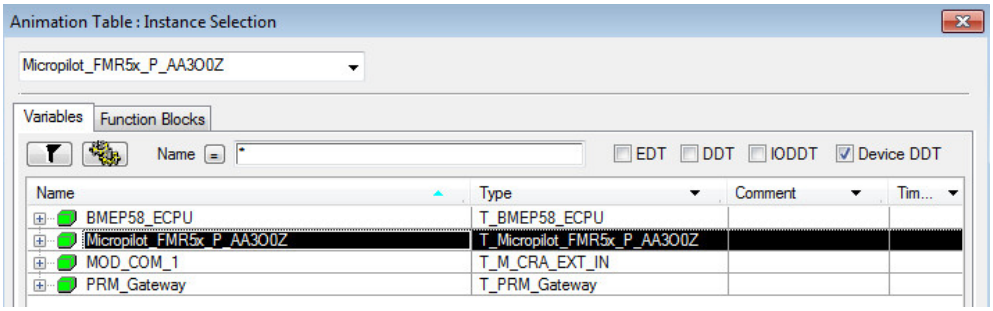
- Double-click on the animation table “PROFIBUS_DP_devices”.
  Following window is displayed.



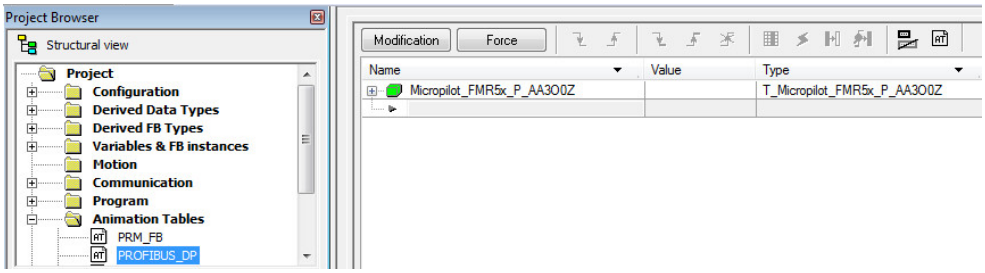
- Double-click on the field “Name “in order to display the button “...”.



- Select the variable “Micropilot_FMR5x” and click on the button “OK”.



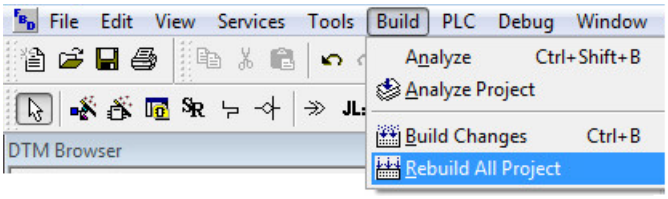
- Selected variable is added in the animation table.



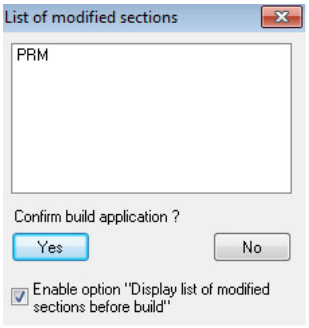
3.4 Commissioning of the Control Project

3.4.1 Project compilation

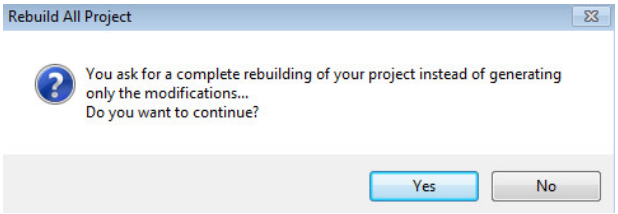
- Select the menu "Build→Rebuild All Project".



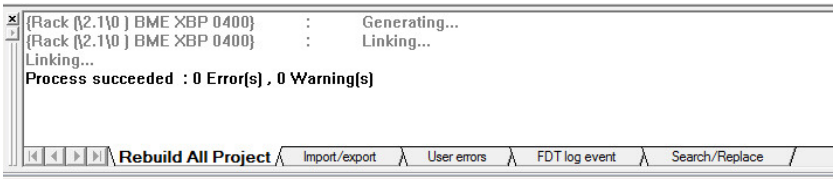
- Following Message box is displayed.
  Click on the button "Yes" to continue.



- Following Message box is displayed.
  Click on the button "Yes" to continue.



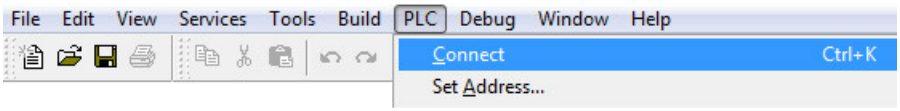
- Compilation is succesful.



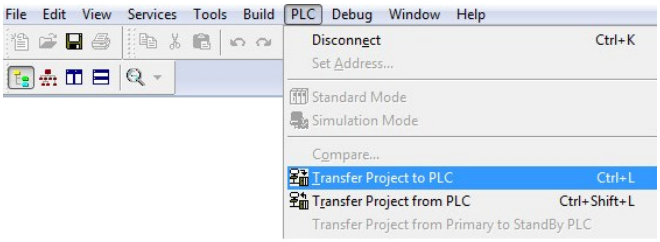
3.4.2 Project download

3.4.2.1 Project download in PLC

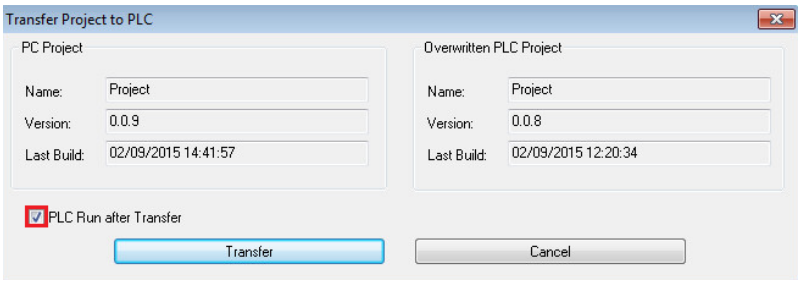
- Select the menu “PLC→Connect” in the tool bar.



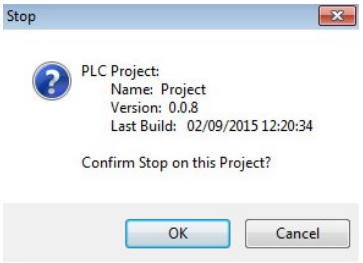
- Once connected, select the menu “PLC→Transfer Project to PLC”.



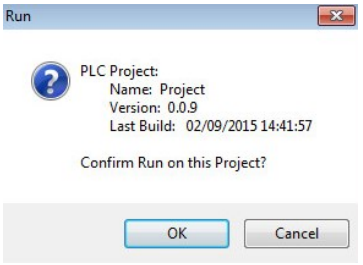
- Following Message Box is displayed. Select the option “PLC Run after Transfer” if needed.



- Following Message Box is displayed. Confirm by clicking on the button “OK”.



- Following Message Box is displayed. Confirm by clicking on the button “OK”.

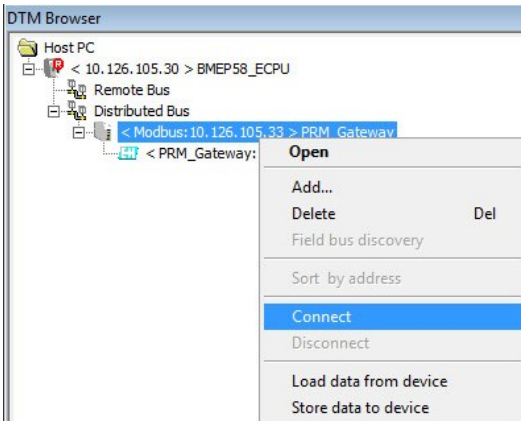


- The PLC is in run mode.

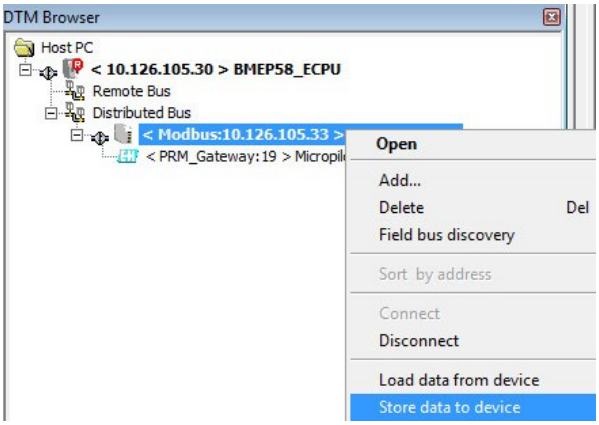
3.4.2.2 Configuration download in PRM Gateway

- Connect the Gateway Ethernet cable.
  The SF LED is red blinking.

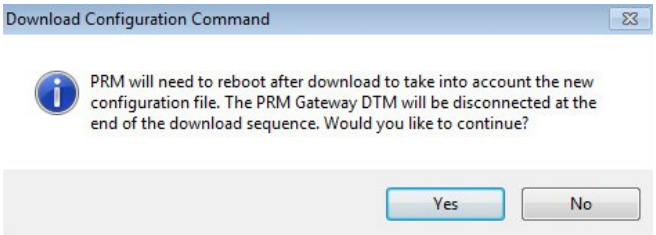
- Connect the Gateway in Online mode.
  Right-click on the PRM Gateway and select the menu “Connect”.



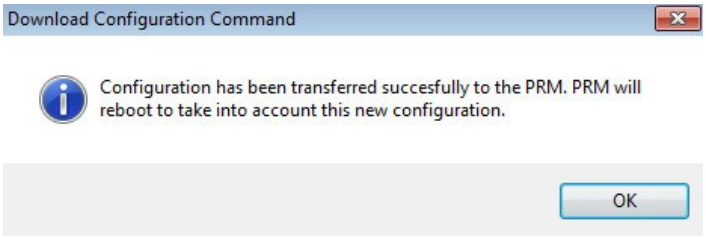
- Once in Online mode, right-click on the PRM Gateway and select the menu “Store data to device”.



- Following Message Box is displayed. Click on the button “OK” to continue.



- Following Message Box is displayed. Click on the button “OK” to continue.



- After the PRM Gateway reboot, the SF LED is OFF and the RUN/STOP LED is green.

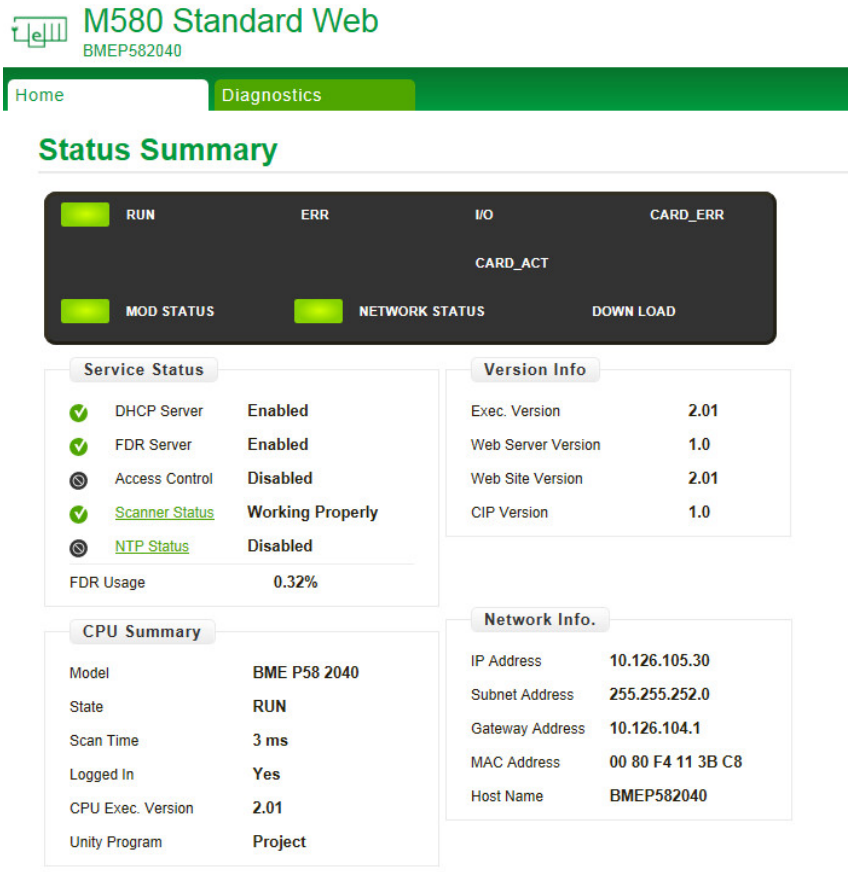
3.5 Monitoring of Process Values and Status Information

3.5.1 Diagnostics via Web Browser

- Open a web browser and enter the IP PLC IP address.
  In this example, the PLC IP address is 10.126.105.30.

3.5.1.1 PLC & Network Diagnostics

- The M580 Standard Web page is displayed.
  This page Tag shows:
  - PLC status.
  - Version Info.
  - Network configuration.

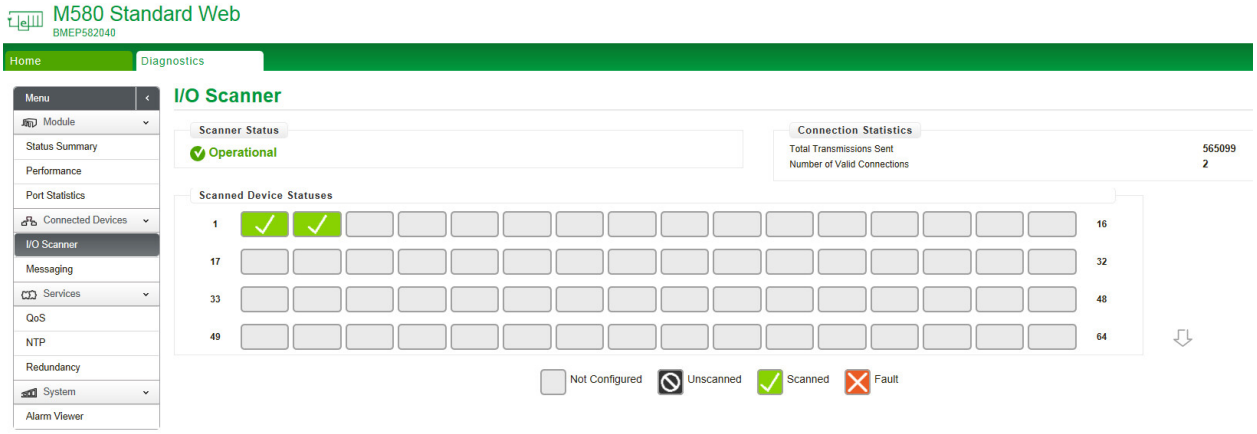


3.5.1.2 I/O Scanner

- Click on the Tag “Diagnostics” and select the menu “I/O Scanner”.

In this example, two devices have been scanned:

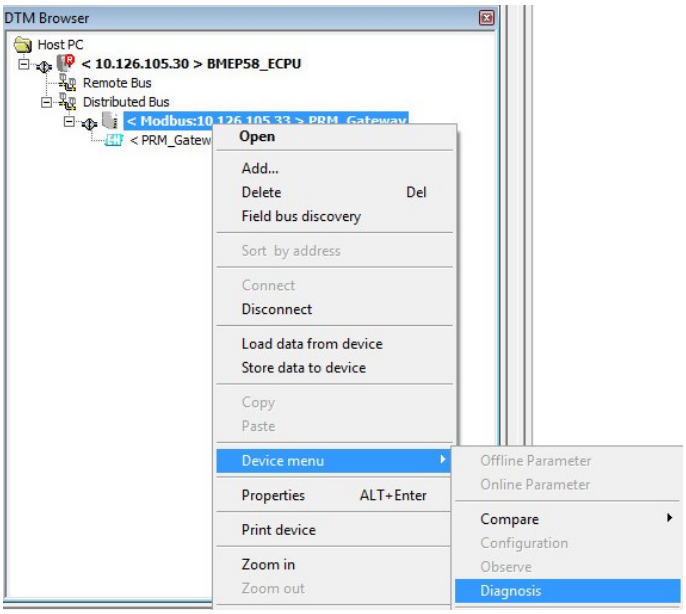
- The PRM Gateway with IP address 10.126.105.33.
- The CRA module with IP address 10.126.105.32.



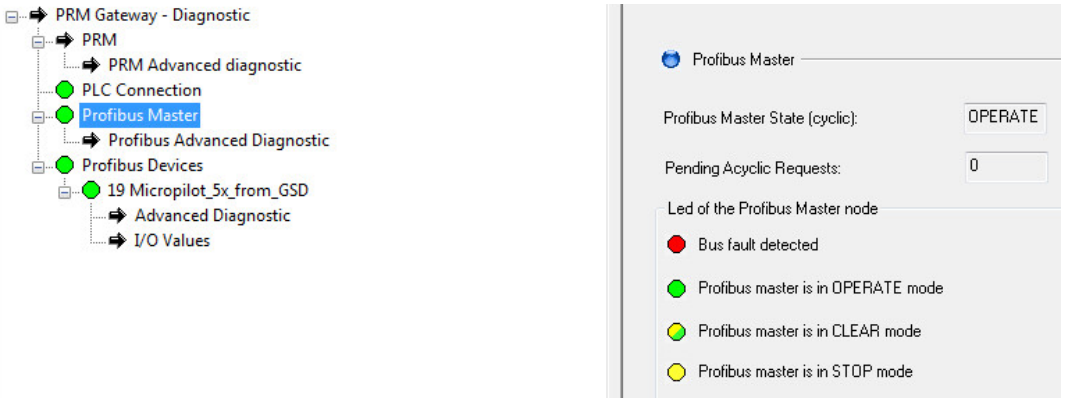
3.5.1.3 PROFIBUS Diagnostics

3.5.1.3.1 PRM Gateway

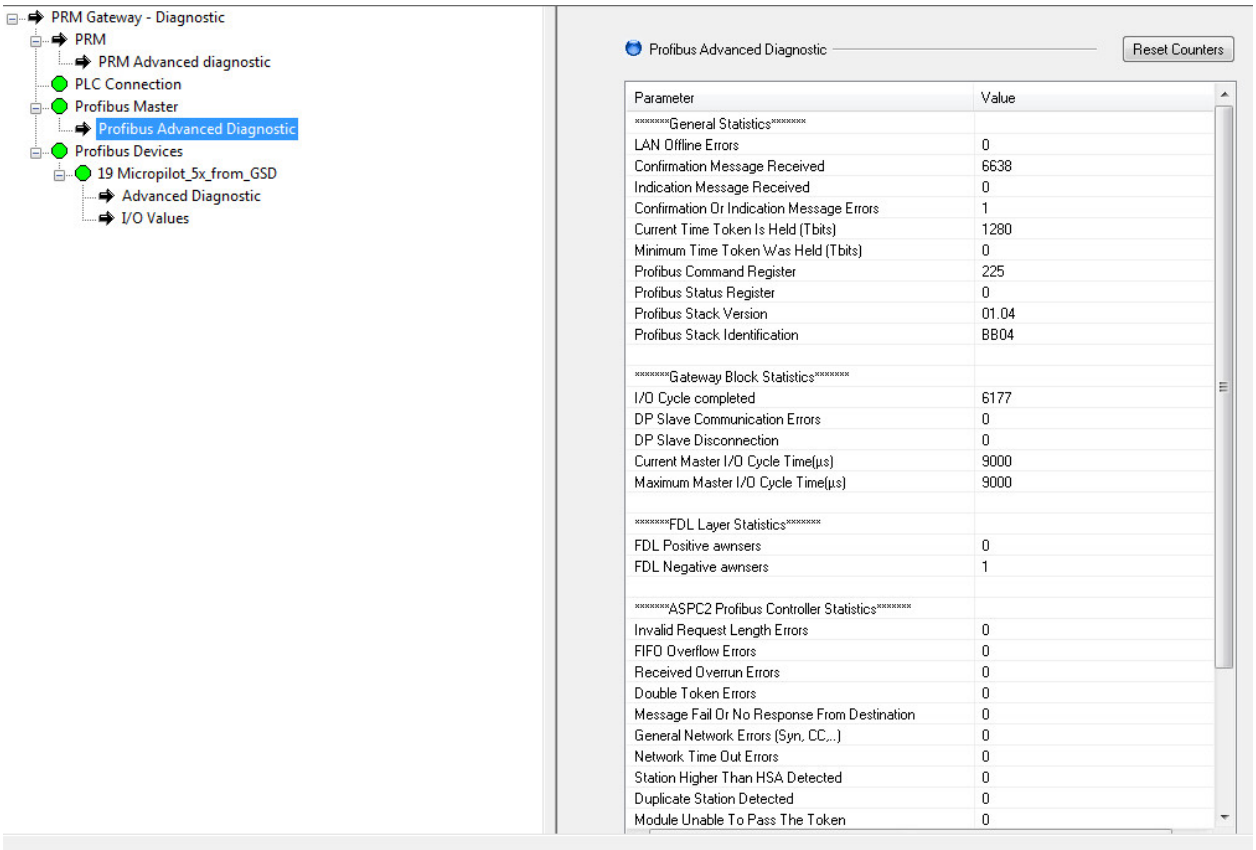
- In the DTM Browser view, right-click on the DTM “PRM_Gateway” and select the menu “Device menu→Diagnosis”.



- Select the field “Profibus Master”.
  The PRM Gateway has the status “Operate”.

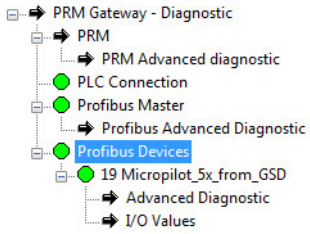


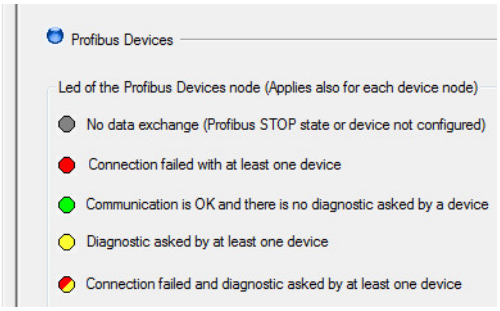
- Select the field “Profibus Advances Diagnostics” to get more details.



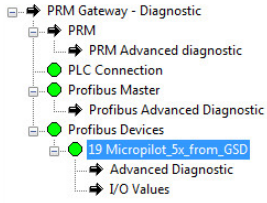
3.5.1.3.2 PROFIBUS devices

- Select the field “Profibus Devices” to display all available status.
  In this example, the Micropilot is successfully connected to the PRM Gateway.

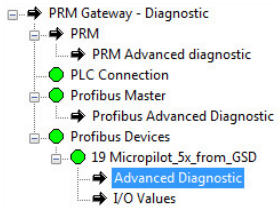


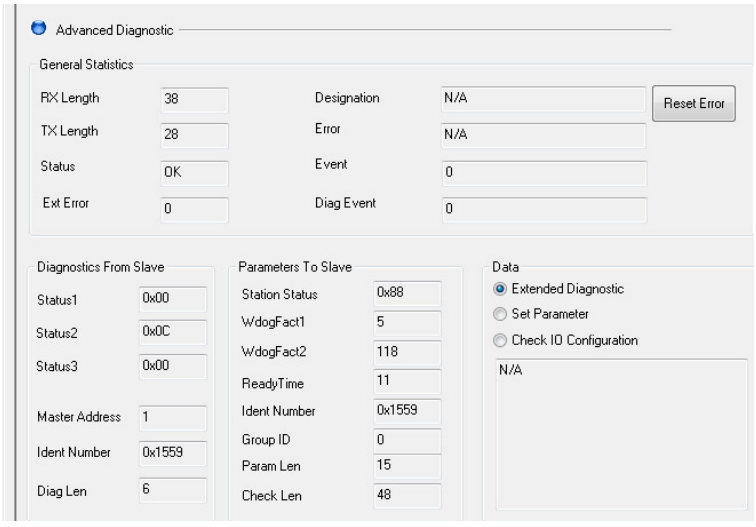


- Select the field “Micropilot_5x_from_GSD” to get device diagnostics.

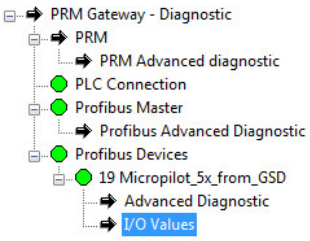


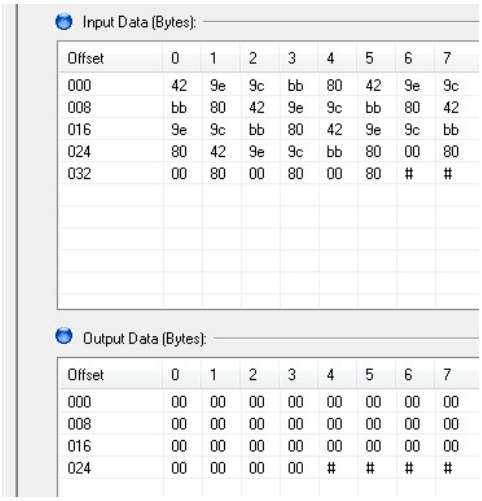
- Select the field “Advanced Diagnostic” to get more details.





- Select the menu “I/O Values” to display input/output buffers content.





Input Data (Bytes):

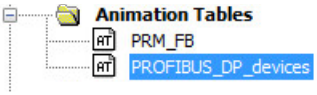
Offset	0	1	2	3	4	5	6	7
000	42	9e	9c	bb	80	42	9e	9c
008	bb	80	42	9e	9c	bb	80	42
016	9e	9c	bb	80	42	9e	9c	bb
024	80	42	9e	9c	bb	80	00	80
032	00	80	00	80	00	80	#	#

Output Data (Bytes):

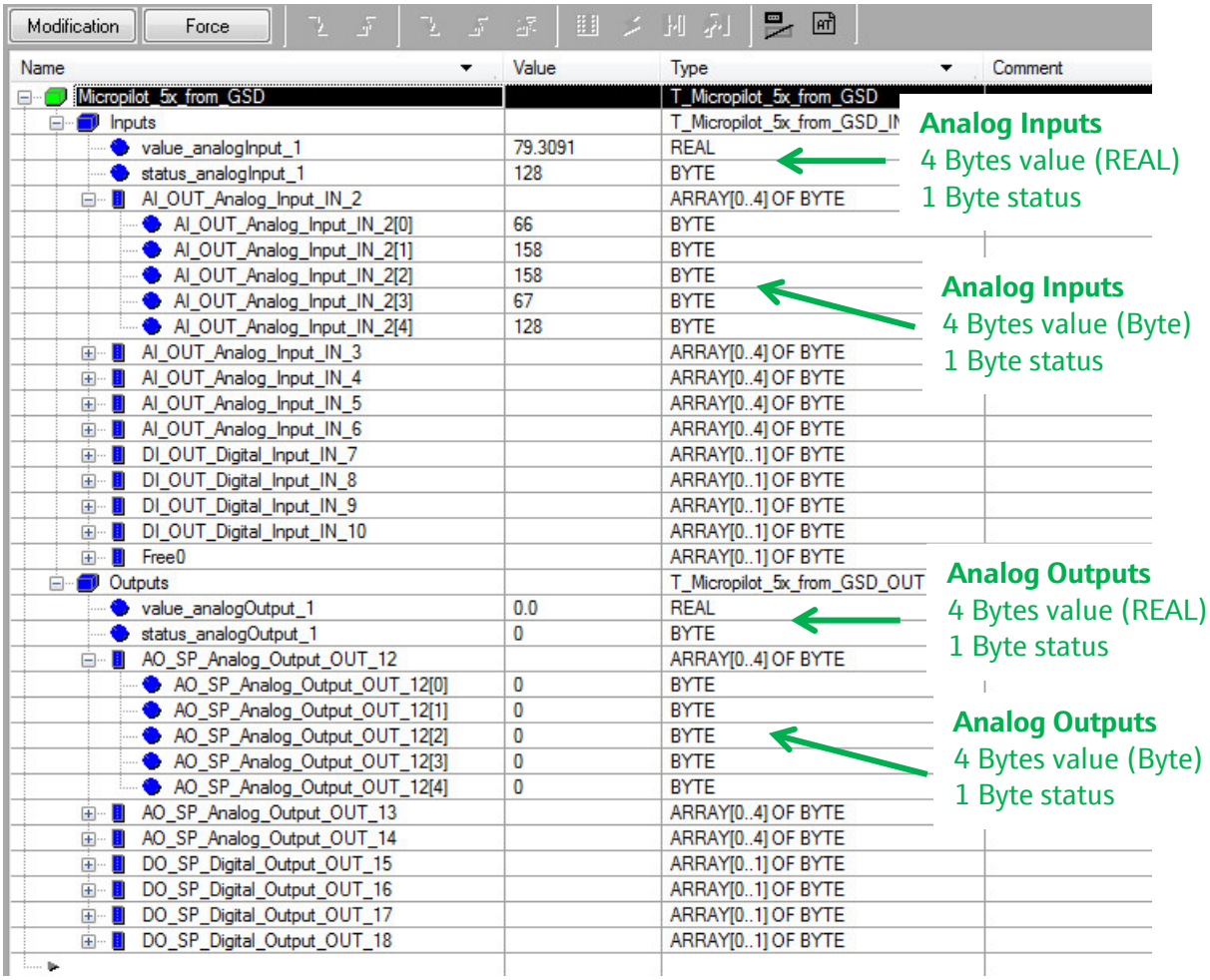
Offset	0	1	2	3	4	5	6	7
000	00	00	00	00	00	00	00	00
008	00	00	00	00	00	00	00	00
016	00	00	00	00	00	00	00	00
024	00	00	00	00	#	#	#	#

3.5.2 Online monitoring

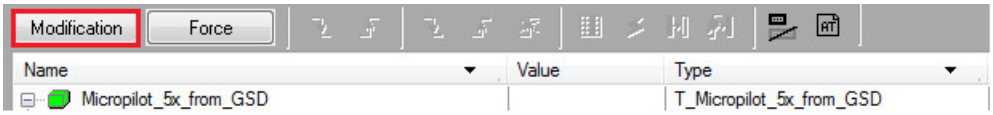
- In the Project Browser, open the Animation table “PROFIBUS_DP_devices”.



- Expand the data structure “Micropilot_5x_from_GSD”.



- To edit outputs values/status, click at first on the button “Modifiation”.



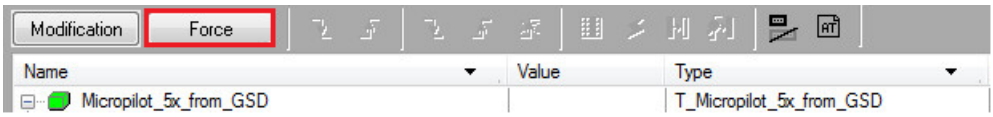
- Editable outputs fields become bold.

Outputs		T_Micropilot_5x_from_GSD_OUT	Output Variables
value_analogOutput_1	**0.0**	**REAL**	
status_analogOutput_1	**0**	**BYTE**	
AO_SP_Analog_Output_OUT_12		ARRAY[0..4] OF BYTE	
AO_SP_Analog_Output_OUT_12[0]	**0**	**BYTE**	
AO_SP_Analog_Output_OUT_12[1]	**0**	**BYTE**	
AO_SP_Analog_Output_OUT_12[2]	**0**	**BYTE**	
AO_SP_Analog_Output_OUT_12[3]	**0**	**BYTE**	
AO_SP_Analog_Output_OUT_12[4]	**0**	**BYTE**	
AO_SP_Analog_Output_OUT_13		ARRAY[0..4] OF BYTE	
AO_SP_Analog_Output_OUT_14		ARRAY[0..4] OF BYTE	
DO_SP_Digital_Output_OUT_15		ARRAY[0..1] OF BYTE	
DO_SP_Digital_Output_OUT_16		ARRAY[0..1] OF BYTE	
DO_SP_Digital_Output_OUT_17		ARRAY[0..1] OF BYTE	
DO_SP_Digital_Output_OUT_18		ARRAY[0..1] OF BYTE	

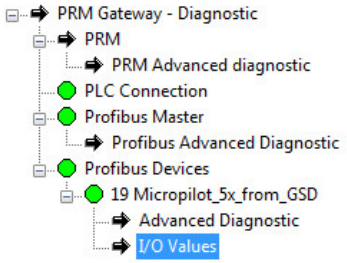
- Edit the requested variable value and status.
  For example, the analog output:

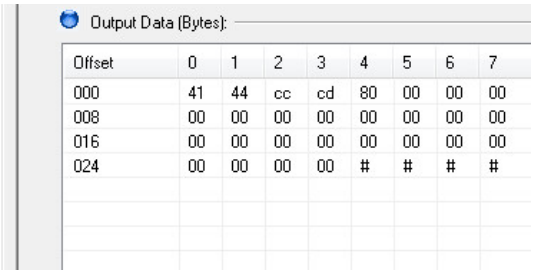
Outputs		T_Micropilot_5x_from_GSD_OUT
value_analogOutput_1	**12.5**	**REAL**
status_analogOutput_1	128	BYTE

- Click on the button “Force” to validate.



- Output values are written on the bus.





Offset	0	1	2	3	4	5	6	7
000	41	44	cc	cd	80	00	00	00
008	00	00	00	00	00	00	00	00
016	00	00	00	00	00	00	00	00
024	00	00	00	00	#	#	#	#

4 Advanced Integration

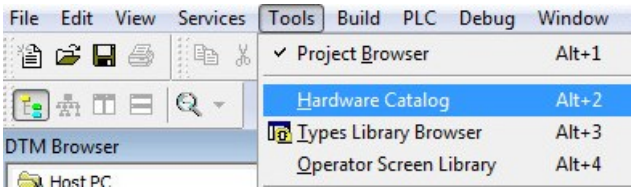
The Advanced Integration workflow is identical as the Basic Integration except for the Field Network and Device Configuration, in which DTMs are used instead of GSDs.

4.1 Field Network configuration with DTM

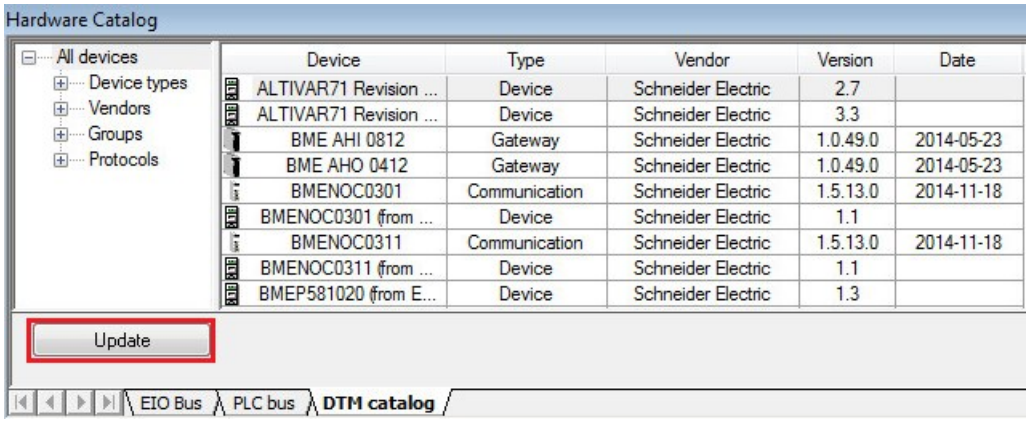
4.1.1 Device DTMs Library

- Install the Endress+Hauser Profibus DTM Library V2.41.00.

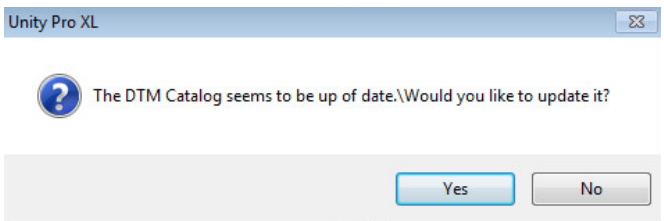
- Open the Hardware Catalog by clicking on the menu "Tools→Hardware Catalog".



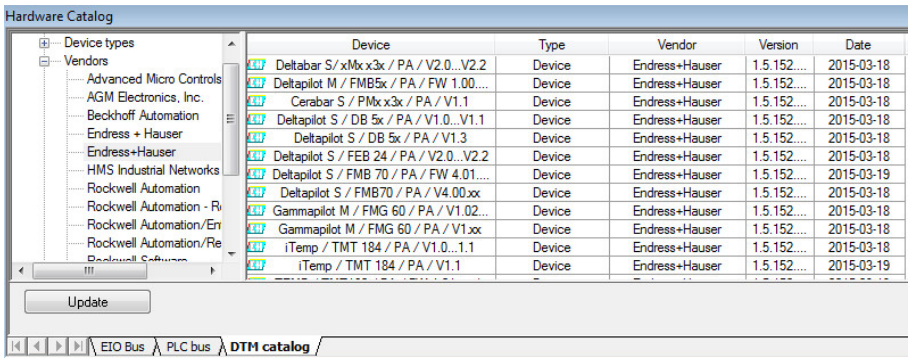
  - Click on the button "Update" to update the DTM catalog database.



  - Following Message Box is displayed.
    Click on the button "Yes".



- Endress+Hauser device DTMs are now installed.

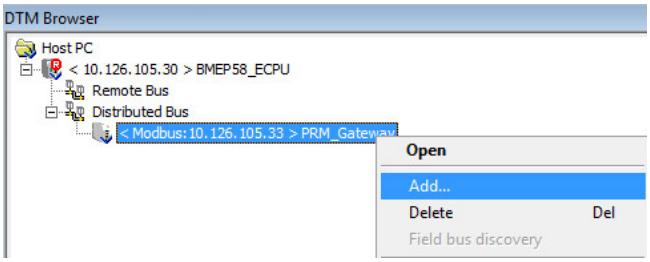


- All imported device DTMs are reasonably assigned to predefined folders :
  - Device types → Devices
  - Vendors → Endress+Hauser
  - Groups →DTM specific
  - Groups → Electromechanical Analyser
  - Groups → Flow
  - Groups → Level
  - Groups → Pressure
  - Groups → Temperature
  - Protocols → Profibus DPV1

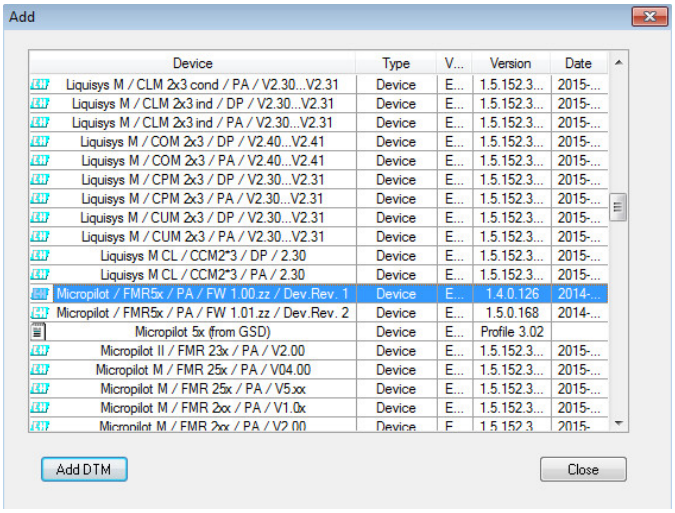
4.1.2 Field Device Configuration with DTM

4.1.2.1 New field device

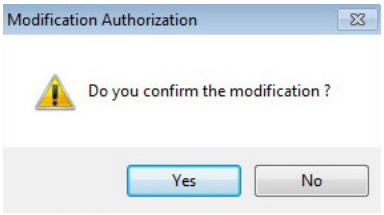
- In the DTM browser, right-click on the PRM Gateway DTM and select the menu “Add”.



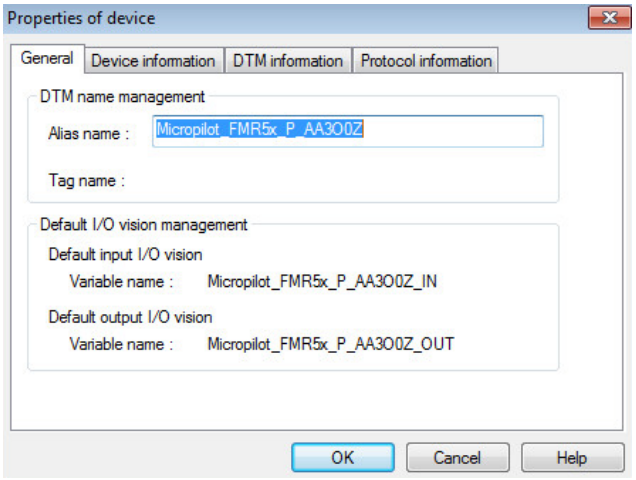
- Select the device DTM “Micropilot/FMR5x/PA/FW1.00.zz/Dev.Rev.1” and click on the button “Add DTM”.



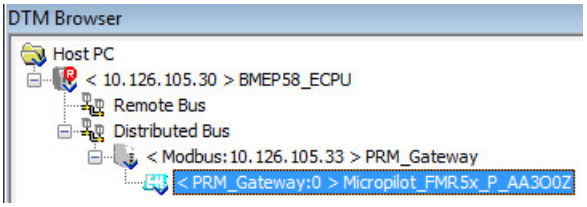
- Following window is displayed.
  Click on the button “Yes” to continue.



- Following window is displayed.
  Click on the button “OK” to continue.



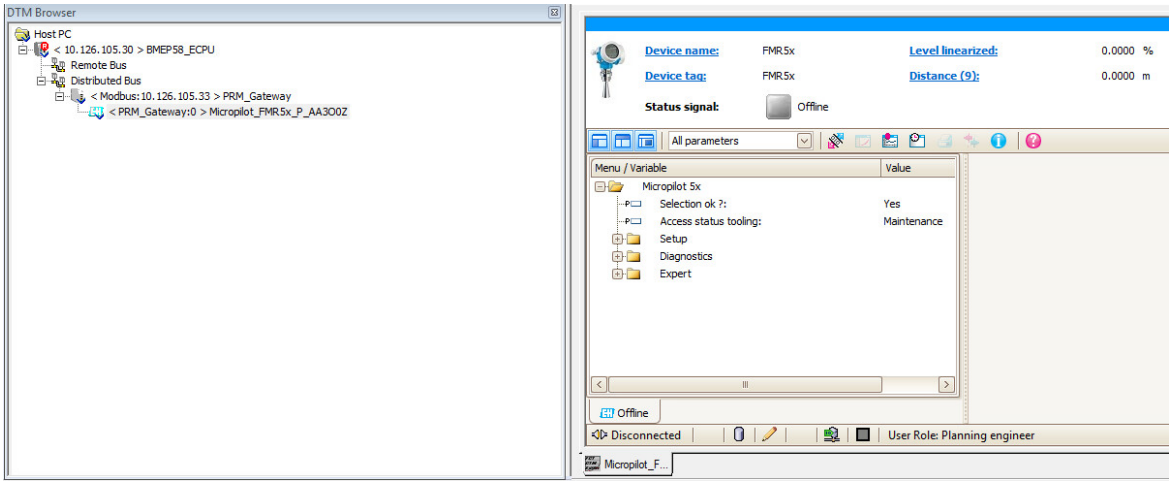
- The Micropilot is inserted in the DTM browser Project structure with the address 0.



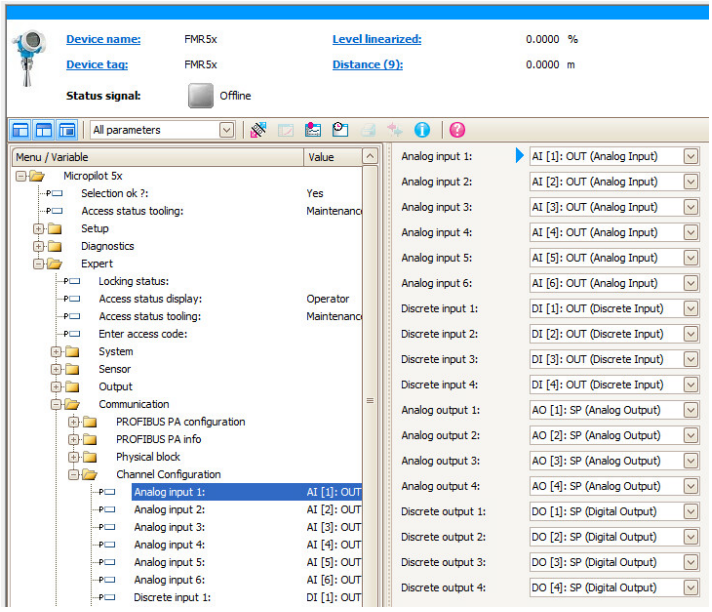
4.1.2.2 IO modules configuration

- Double-click on the Micropilot DTM.

- This opens the device DTM configuration window in Offline mode.



- Click on the menu “Micropilot 5x→Expert→Communication→Channel Configuration”.
  The default IO module configuration is already set.



- This default IO module configuration can be changed.
  In the following example, the module “AI” of slot 1 is replaced by the module “Free Place”, according to the GSD IO module definition.

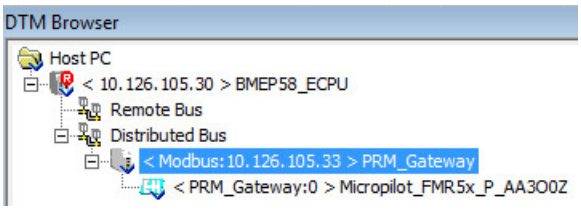
  - Select the module “Free Place” and Click on the keyboard button “Enter” to confirm.

- The new module is successfully inserted.

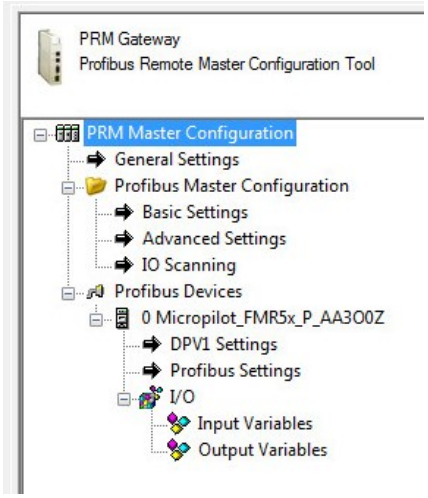
- Close the DTM window.

4.1.2.3 Field Device settings

- Double-click on the PRM_Gateway DTM.



- The menu “Profibus Devices” is now available in the PRM Master Configuration view.



- **PROFIBUS address / DPV1 Settings/ PROFIBUS Settings/ IO modules data structure configuration**
  The principle is exactly the same as for the GSD integration, described in part 3.2.4.1.3 PROFIBUS address.

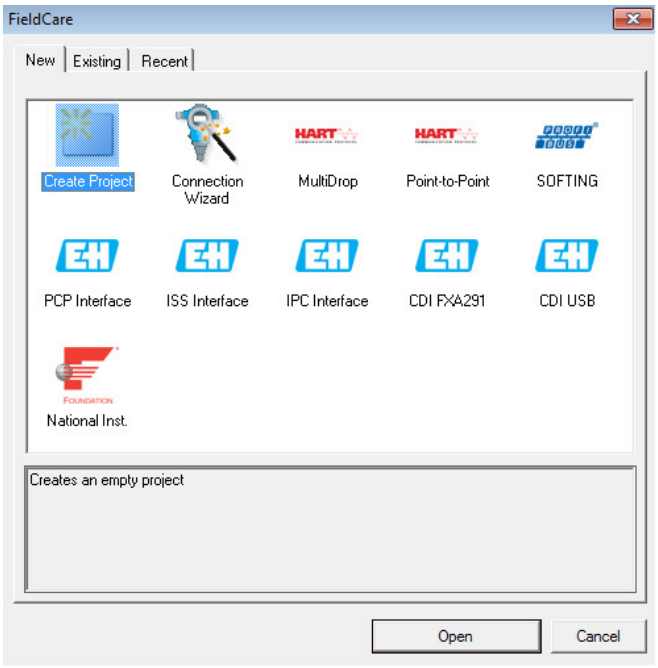
5 Routed Tool Integration

This chapter describes the main workflow for integration of Schneider Electric system components to the Endress+Hauser Plant Asset Management (PAM system) by means of Communication DTMs. As a result, the Endress+Hauser PAM system can access underlying PROFIBUS devices via Schneider Electric Ethernet backbone for device configuration.

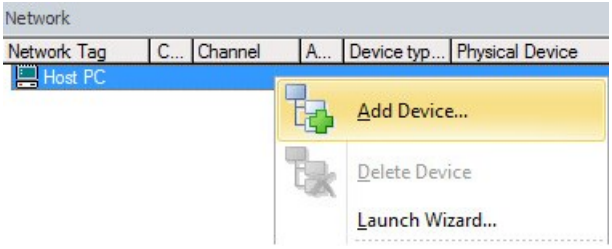
5.1 Schneider Electric “PRM Comm” DTM configuration

- Start the application FieldCare.

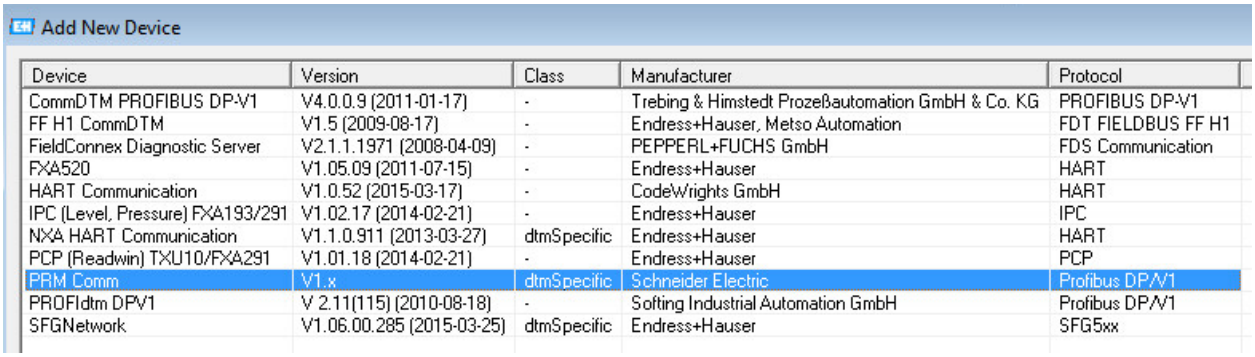
- Create a new project.



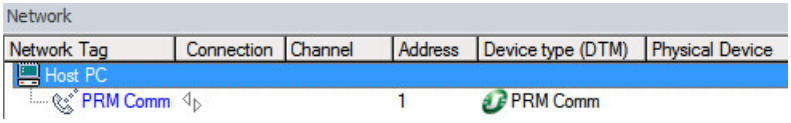
- Right-click on the Network Tag “Host PC” and select the menu ” Add Device”.



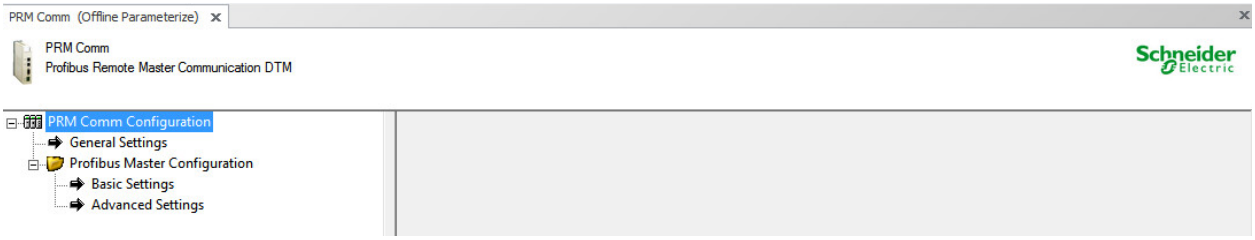
- Select the DTM “PRM Comm” and click on the button “OK”.



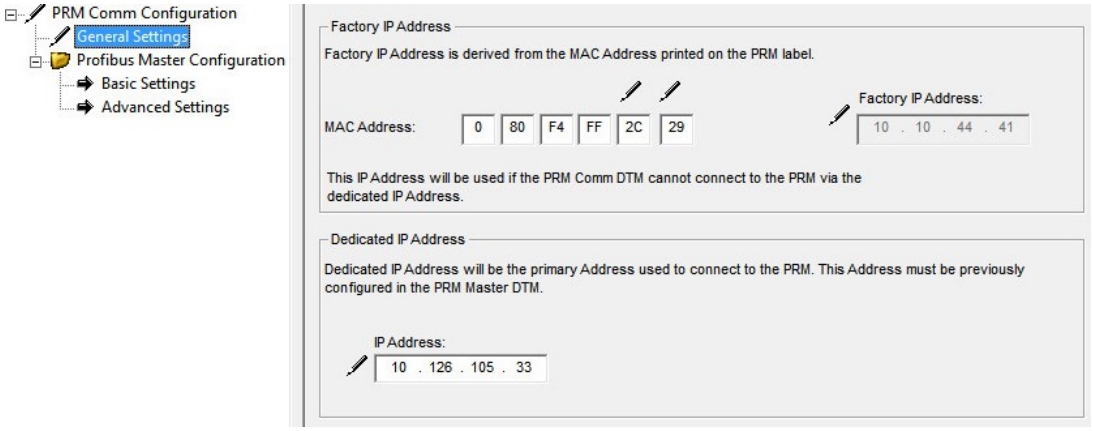
- The new DTM “PRM Comm” is implemented in the Network view.



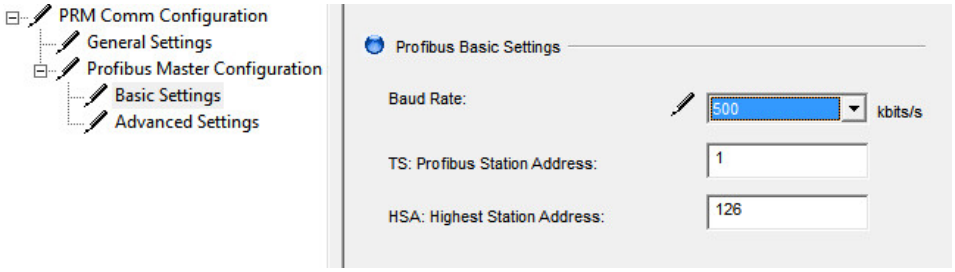
- Double-click on the DTM “PRM Comm”.
  This opens the window “Offline Configuration”.



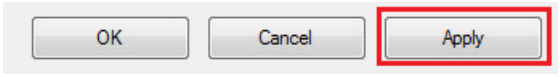
- Select the menu “General Settings”.
  - Enter the PRM Gateway MAC address →0:80:F4:FF:2C:29 in this example.
  - Enter the PRM Gateway IP address → 10.126.105.33 in this example.



- Select the menu “Basic Settings” and the Profibus address and Baudrate.



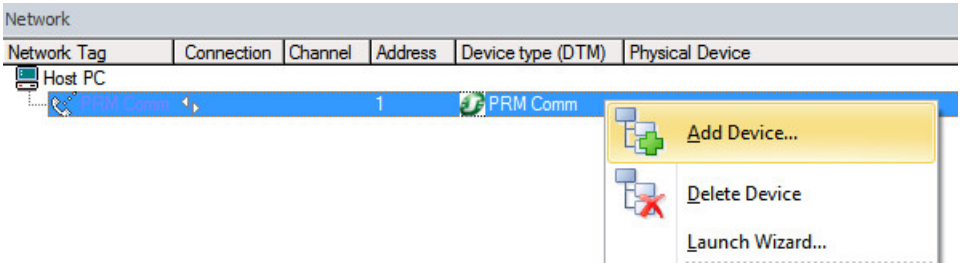
- Save the new settings by clicking on the button “Apply”.



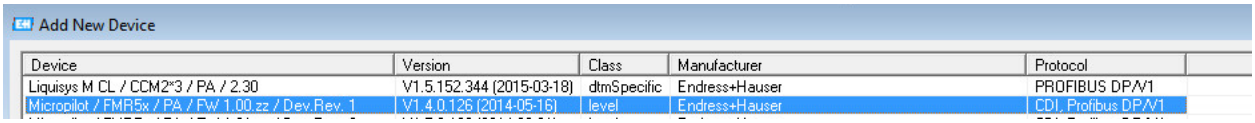
Remark :
“Advanced settings” will be updated when the devices are added in the configuration.

5.2 Endress+Hauser device DTM configuration

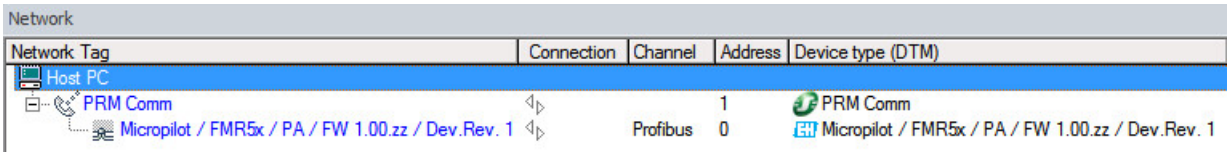
- Right-click on the DTM “PRM Comm” and select the menu “Add Device...”.



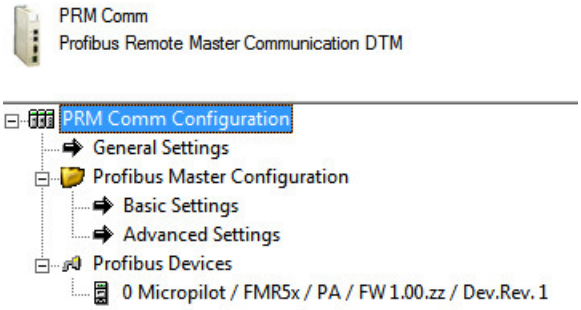
- Select the DTM Micropilot in this example.



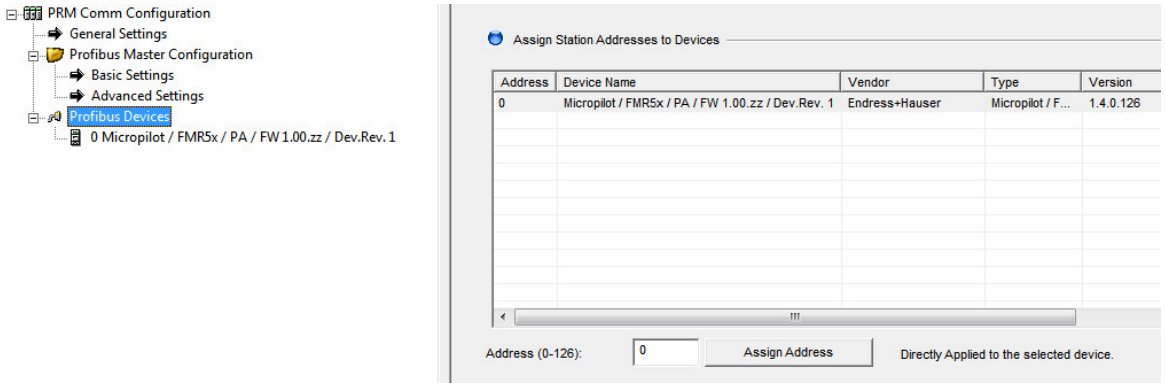
- Device DTM is implemented in the Network view.



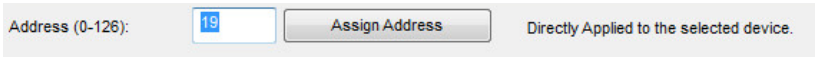
- Double-click on the DTM “PRM Comm” to open the “Offline Parameterize”.



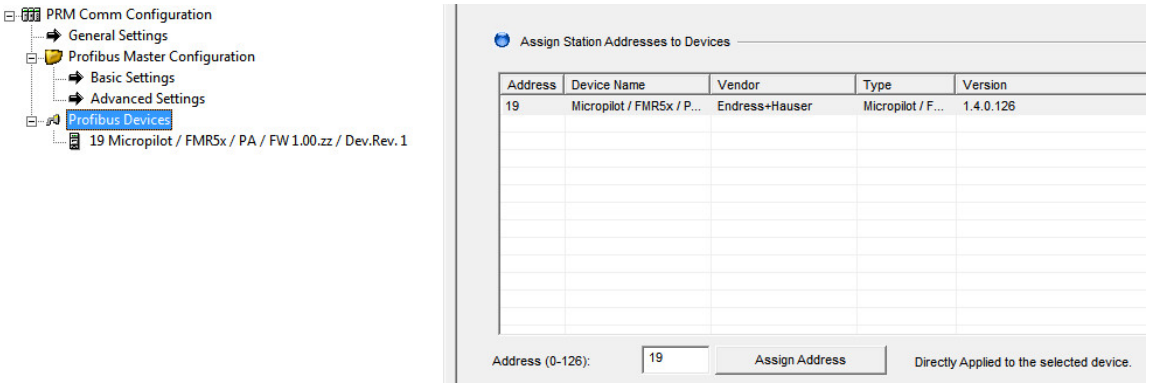
- Select the menu “Profibus Devices”.



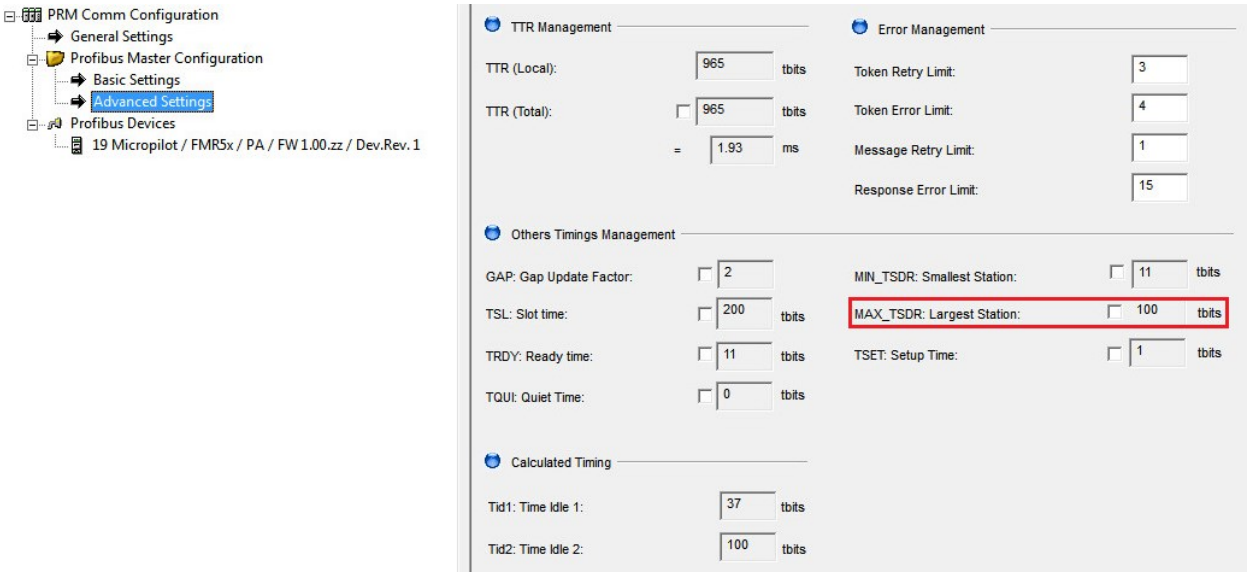
- Give the new PROFIBUS address and click on the button “Assign Address”.
  In this example, the new PROFIBUS address is 19.



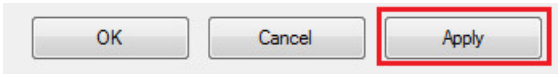
- New PROFIBUS slave address is updated.



- Select the menu “Advance Settings” and verify the parameter “MAX_TSDR : Largest Station”, which need to correspond according to the selected Baudrate.

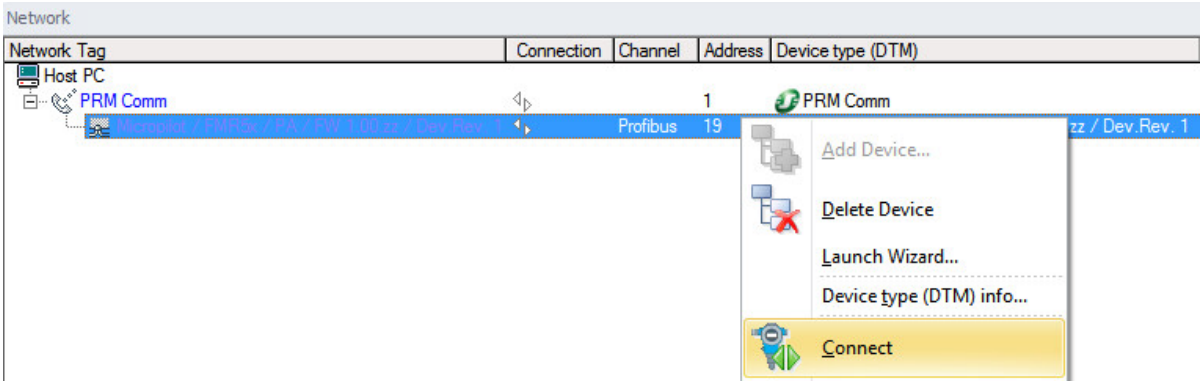


- Save the new settings by clicking on the button “Apply”.

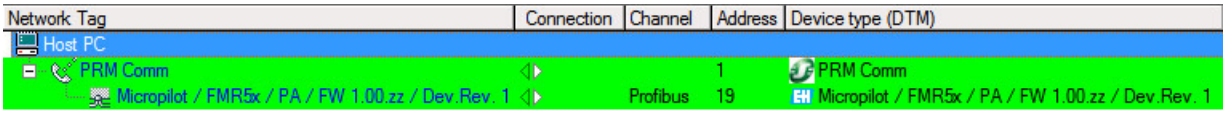


5.3 DTM Online mode

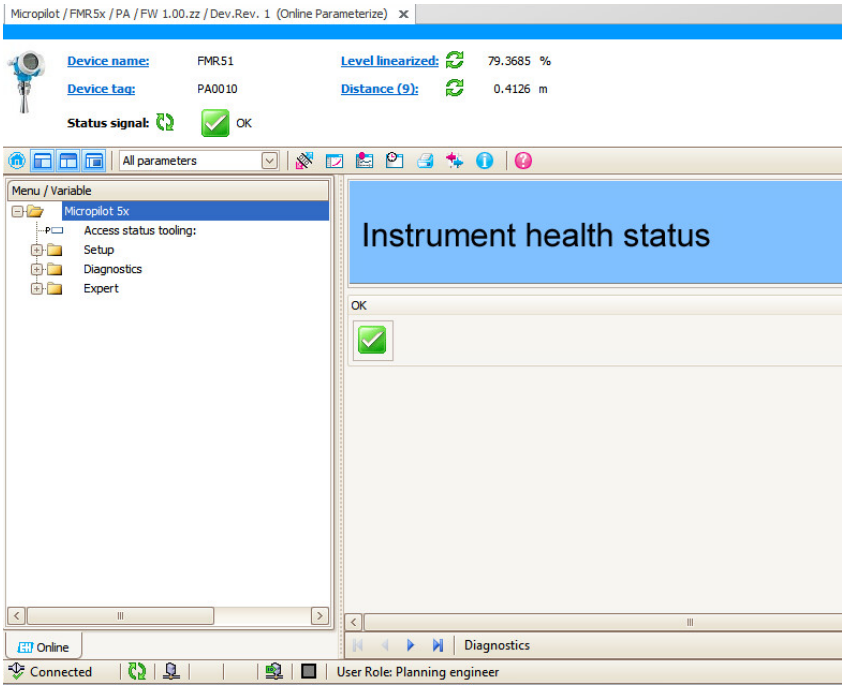
- Right-click on the device DTM and select the menu “Connect”.



- Connected devices



- Double-click on the device DTM “Micropilot /FMR5x/PA/FW 1.00zz/Dev. Rev. 1”. This opens the device DTM window.

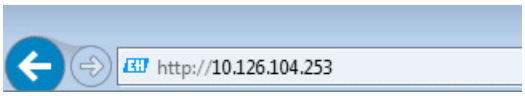


6 Bypassed Tool Integration

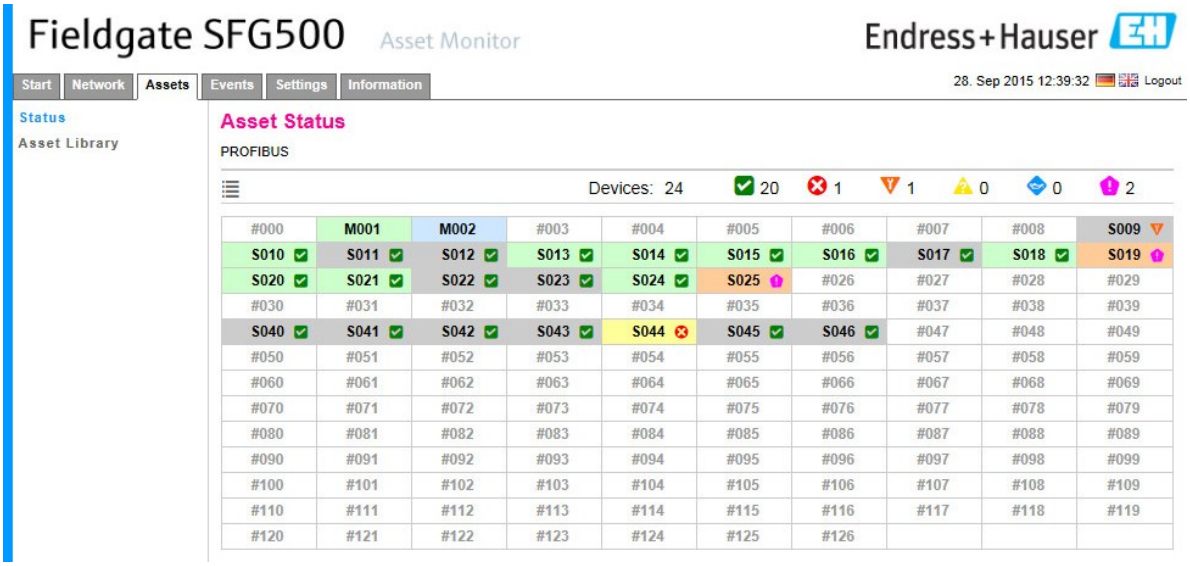
This chapter describes the alternative workflow for commissioning of the Endress+Hauser Plant Asset Management (PAM system) with independent access path via Fieldgate SFG500. As a result, the Endress+Hauser PAM system can access underlying PROFIBUS devices for device configuration and asset health monitoring.

6.1 Fieldgate SFG500 Browser

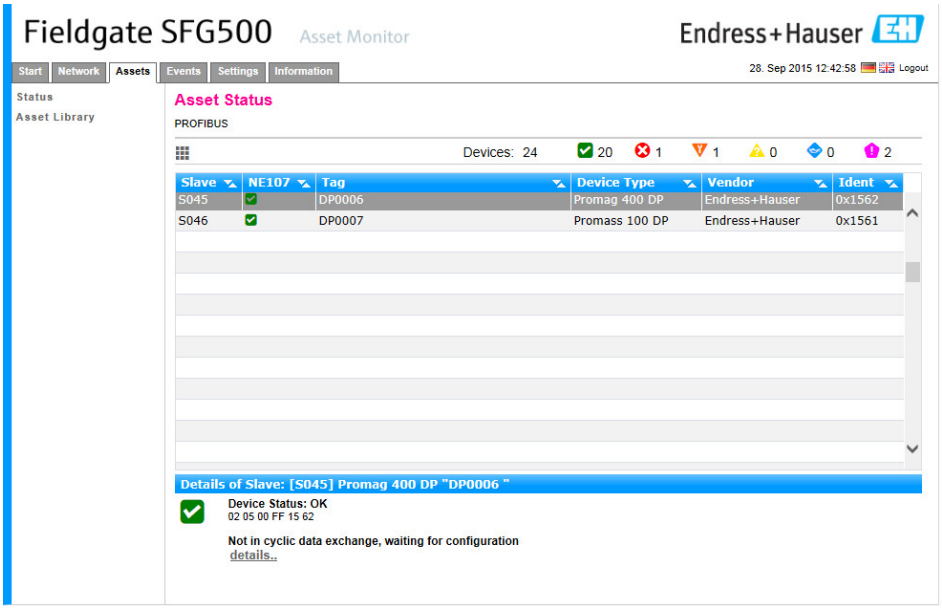
- Check that the SFG500 is connected to the engineering station network.
- Open the browser and enter the IP address of the SFG500, 10.126.104.253 (specific for this example).



- The Fieldgate SFG500 main window is displayed.
  In this view are displayed all detected devices (Masters and slaves) and their corresponding status.



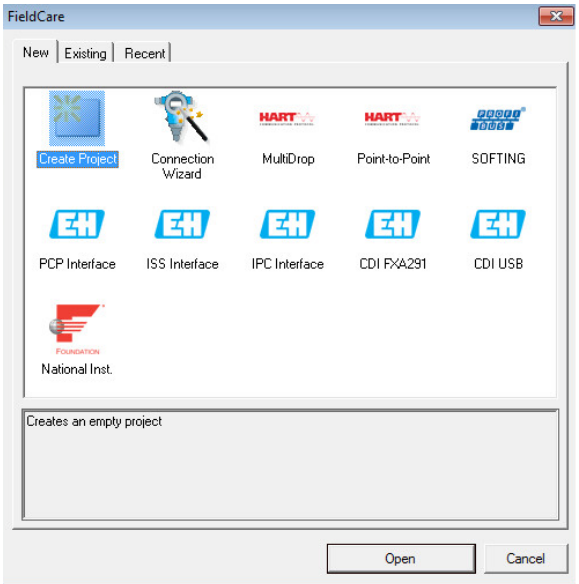
- Click on the shortcut “Show list view” to display the connected device types.
  In this example the Promag 400 DP flowmeter with the FDL address 45 is displayed.



6.2 Endress+Hauser DTM SFG500

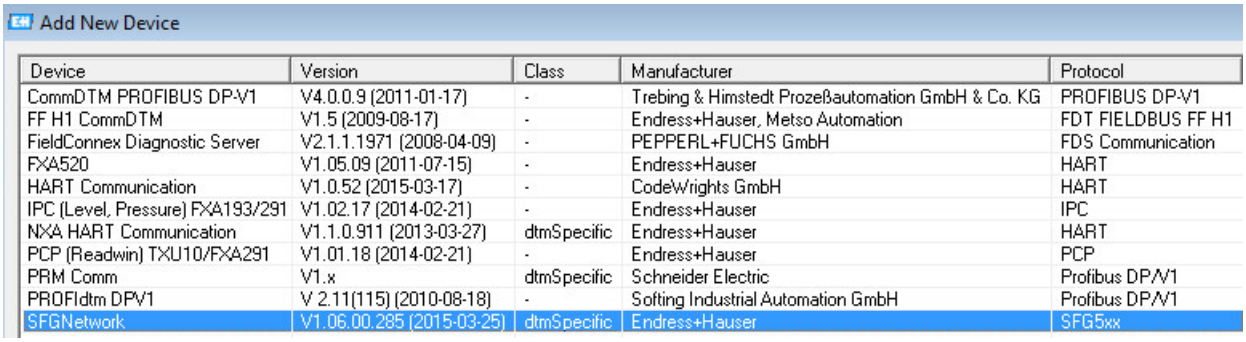
- Start the application FieldCare.

- Create a new project.

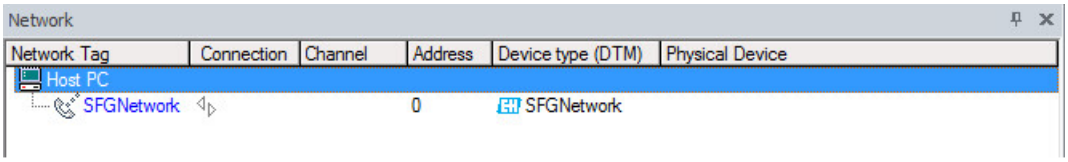


- Right-click on the Network Tag “Host PC” and select the menu ” Add Device”.

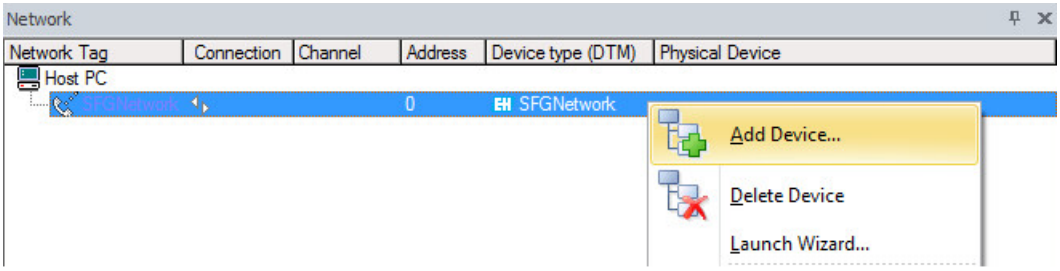
- Add the device “SFGNetwork”.



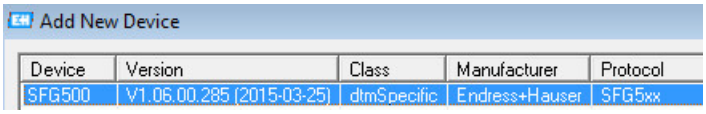
- The new device “SFGNetwork” is then implemented in the Network view.



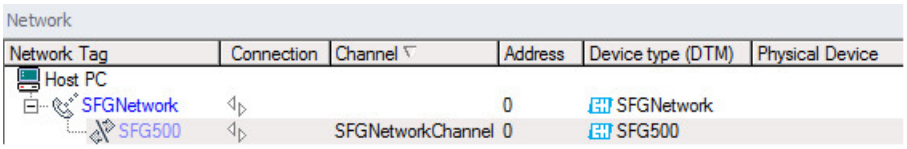
- Right-click on the SFGNetwork device and select the option “Add Device”.



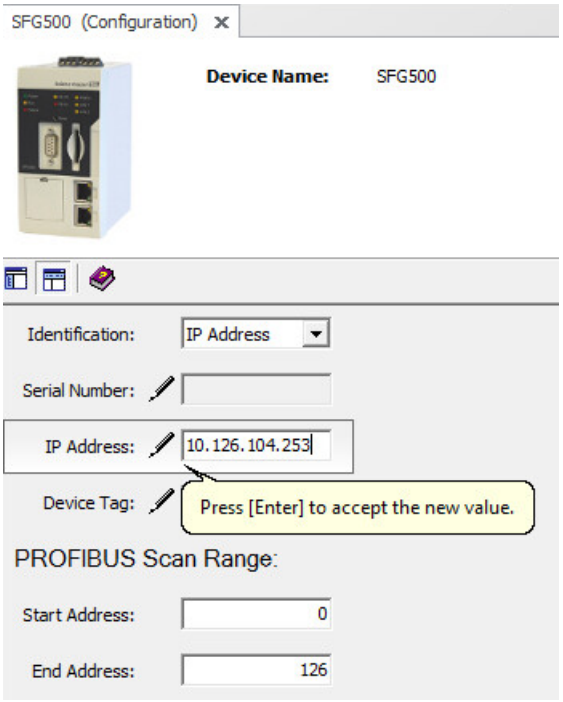
- Select the device “SFG500”.



- Double-click on the device “SFG500”.

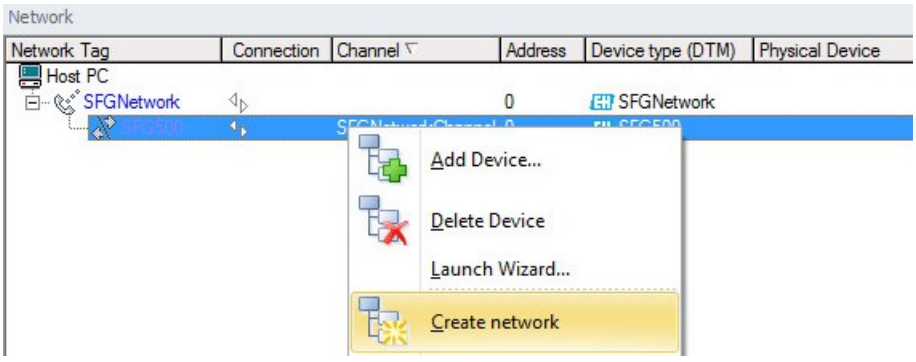


- The “SFG500” configuration window is displayed.



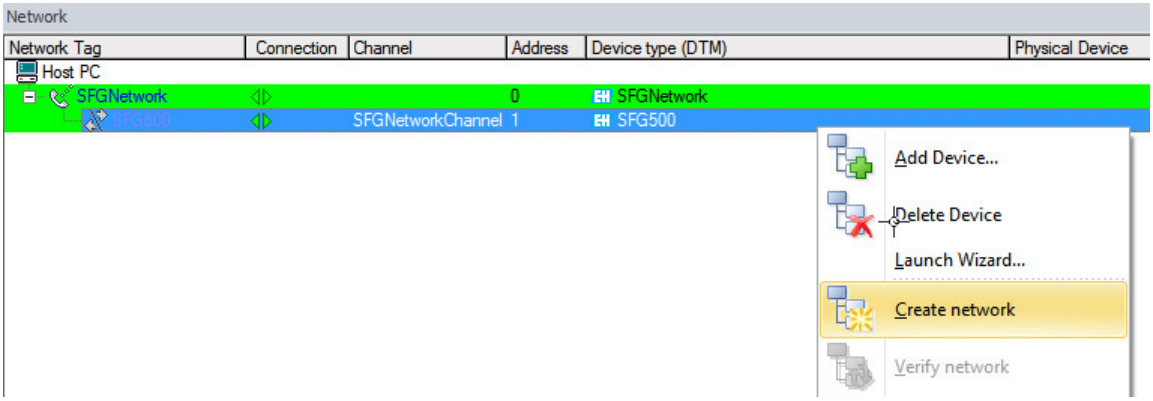
  - Configure the IP address according to the network settings. In this example, the IP address is 10.126.104.253.
  - Click on the keyboard touch “Enter” to validate the IP address.
  - Close the window.

- Right-click on the device “SFG500” and select the menu “Create Network”.

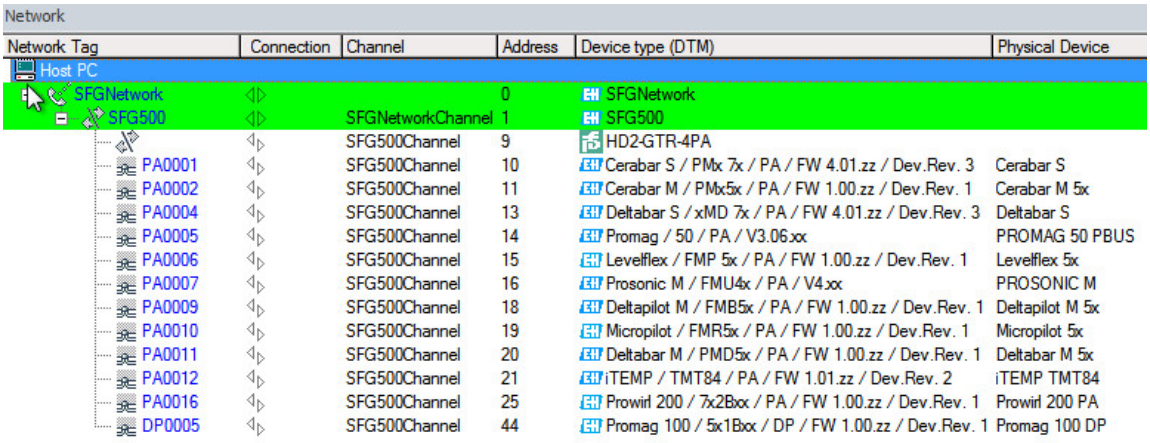


- The Endress+Hauser DTM is then displayed in the Network view.

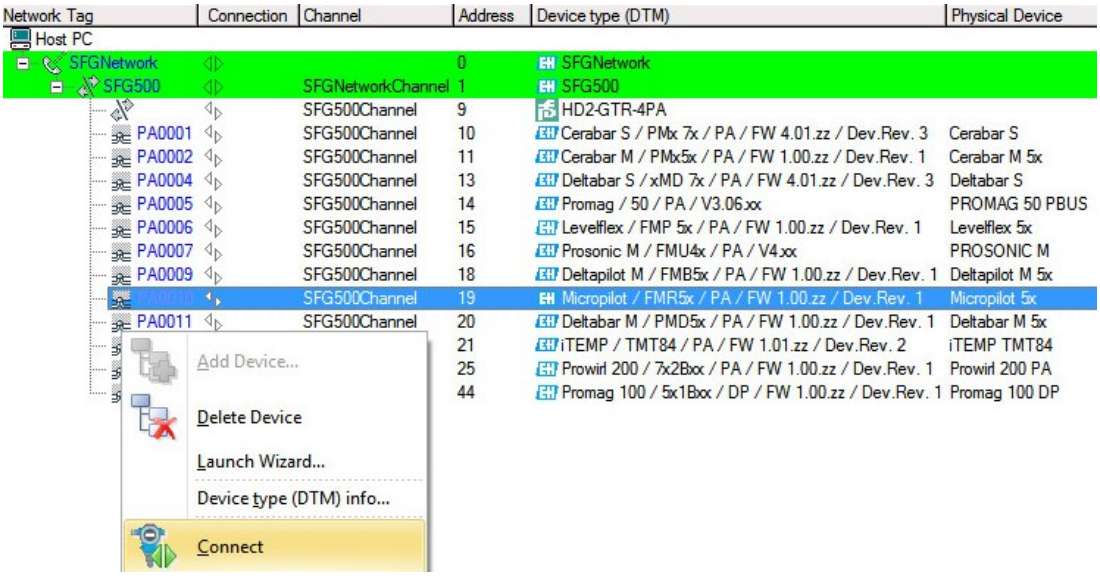
Right-click on the DTM and select the option “Create Network”. The DTM is then searching all connected devices.



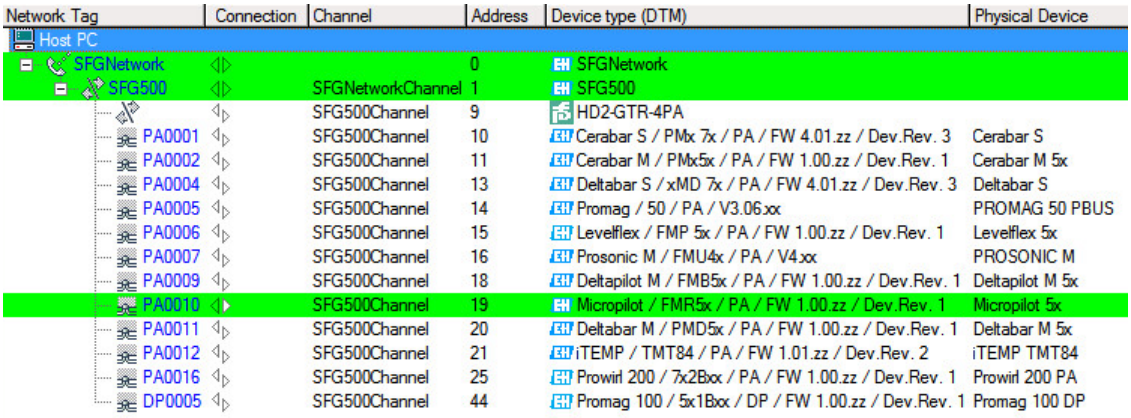
- All found devices are displayed in the Network window.



- Right click on the Micropilot DTM and select the menu “Connect”.

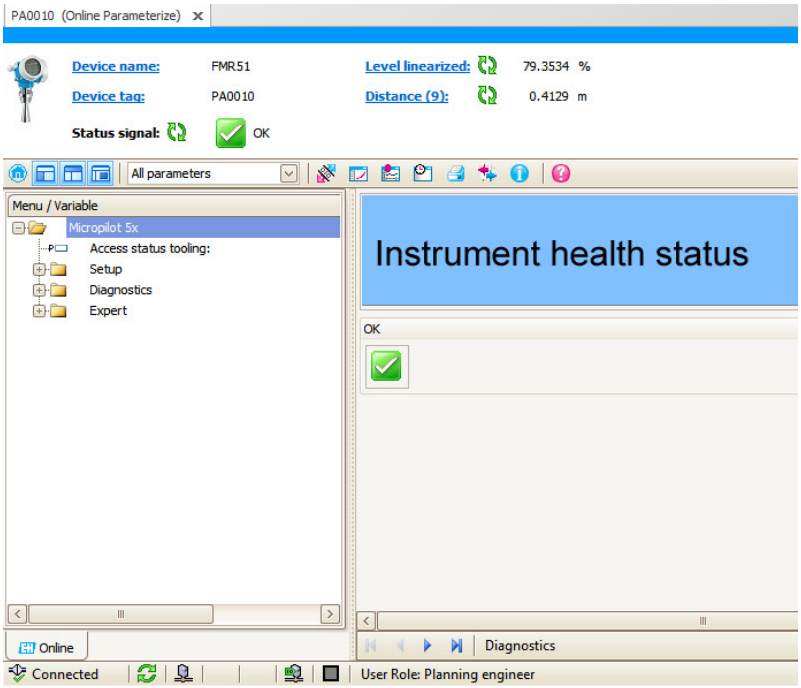


- The Micropilot is now connected (Online mode).



Network Tag	Connection	Channel	Address	Device type (DTM)	Physical Device
Host PC					
SFGNetwork			0	SFGNetwork	
SFG500		SFGNetworkChannel	1	SFG500	
		SFG500Channel	9	HD2-GTR-4PA	
PA0001		SFG500Channel	10	Cerabar S / PMx 7x / PA / FW 4.01.zz / Dev.Rev. 3	Cerabar S
PA0002		SFG500Channel	11	Cerabar M / PMx5x / PA / FW 1.00.zz / Dev.Rev. 1	Cerabar M 5x
PA0004		SFG500Channel	13	Deltabar S / xMD 7x / PA / FW 4.01.zz / Dev.Rev. 3	Deltabar S
PA0005		SFG500Channel	14	Promag / 50 / PA / V3.06.xx	PROMAG 50 PBUS
PA0006		SFG500Channel	15	Levelflex / FMP 5x / PA / FW 1.00.zz / Dev.Rev. 1	Levelflex 5x
PA0007		SFG500Channel	16	Prosonic M / FMU4x / PA / V4.xx	PROSONIC M
PA0009		SFG500Channel	18	Deltapilot M / FMB5x / PA / FW 1.00.zz / Dev.Rev. 1	Deltapilot M 5x
PA0010		SFG500Channel	19	Micropilot / FMR5x / PA / FW 1.00.zz / Dev.Rev. 1	Micropilot 5x
PA0011		SFG500Channel	20	Deltabar M / PMD5x / PA / FW 1.00.zz / Dev.Rev. 1	Deltabar M 5x
PA0012		SFG500Channel	21	iTEMP / TMT84 / PA / FW 1.01.zz / Dev.Rev. 2	iTEMP TMT84
PA0016		SFG500Channel	25	Prowirl 200 / 7x2Bxx / PA / FW 1.00.zz / Dev.Rev. 1	Prowirl 200 PA
DP0005		SFG500Channel	44	Promag 100 / 5x1Bxx / DP / FW 1.00.zz / Dev.Rev. 1	Promag 100 DP

- Double-click on the Micropilot.. The online parameters are displayed.



www.endress.com/open-integration