

Integration Tutorial ME02

Mitsubishi Electric MELSEC System Q - Redundant PLC System
and HART over PROFIBUS for Power & Energy Industry

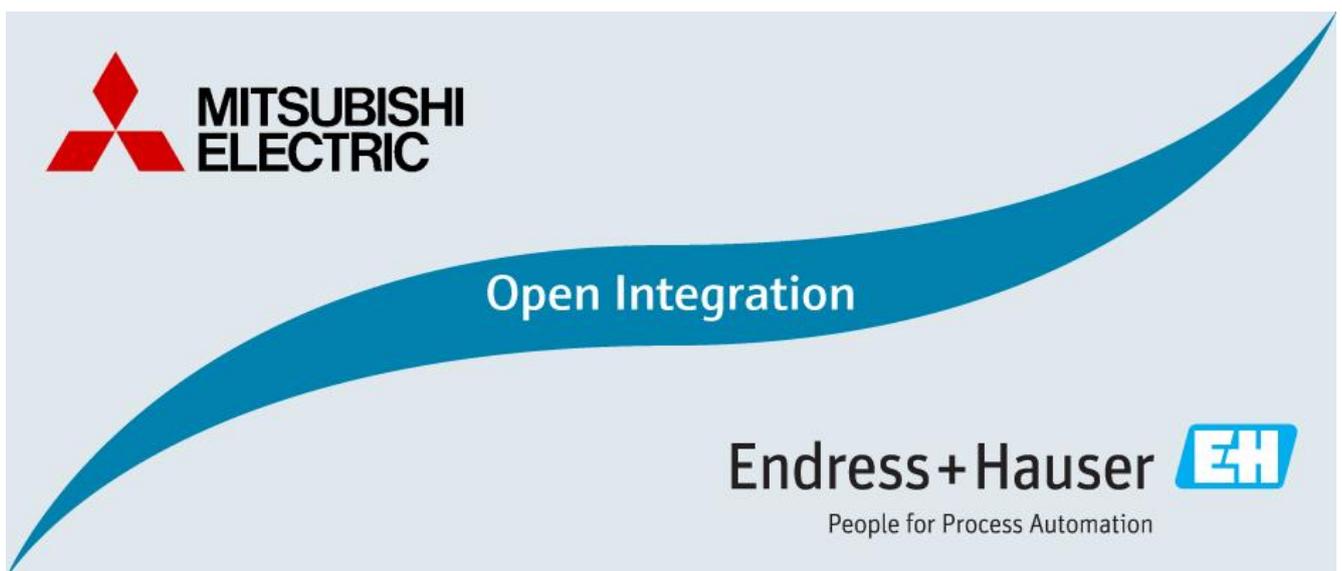


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1 Document Information

1.1 Purpose and Scope

This document provides a step by step description on how to integrate HART devices via Pepperl+Fuchs Remote IO System with a Mitsubishi Electric redundant MELSEC System Q. All content of this document is jointly developed, reviewed and approved by Mitsubishi 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	2016-12	Initial version

1.3 Related Documents

Please refer to related documents as listed below:

Document	Description
SD01765S/04/EN/01.16	Reference Topology ME02
SD01767S/04/EN/01.16	Integration Test Summary ME02
SD01768S/04/EN/01.16	List of Tested Devices and Versions ME02

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 Mitsubishi Electric redundant MELSEC System Q, PROFIBUS DP and HART in general. Please refer to recommended literature as listed in chapter 2.1.

2.1 Recommended Literature

2.1.1 Mitsubishi Electric

Document	Description
sh080486engu	QnPRHCPU User's Manual (Redundant System)
sh080572eng	PROFIBUS-DP Master Module User's Manual QJ71PB92V
sh080782eng	MELSEC Q Structured Programming Manual (fundamentals)
sh080788eng	GX Works2 Beginners 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
536857 2016-06	LB Remote I/O System

2.2 Operable Control System

This document assumes an operable Mitsubishi Electric redundant MELSEC System Q as defined by Reference Topology ME02. Please refer to the manuals listed in chapter 2.1.1 for an explanation on how to use hard- and software provided by Mitsubishi Electric.

2.3 Operable Asset Management System

This document assumes an operable Endress+Hauser PAM System as defined by Reference Topology ME02. 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 Pepperl+Fuchs Remote IO System as defined by Reference Topology ME02. 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 HART devices, as defined by Reference Topology ME02. Each field device is powered if needed and adequately connected to the Remote IO System. If required, please refer to individual device manuals for further advice.

3 Basic Integration

This chapter describes the main workflow for integrating of HART devices into the Mitsubishi Electric redundant MELSEC System Q in combination with a Pepperl+Fuchs Remote IO System. As a result, the 4-20 mA/HART communication is running with the HART IO cards of the Pepperl+Fuchs Remote IO System, whose bus controller is transferring the data via PROFIBUS DP the redundant Mitsubishi Electric MELSEC System Q. Process values are available within the control strategy of the system for further processing.

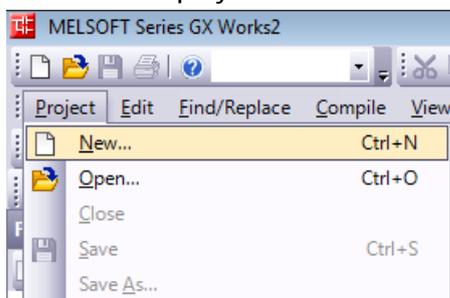
3.1 System Configuration

3.1.1 New Project

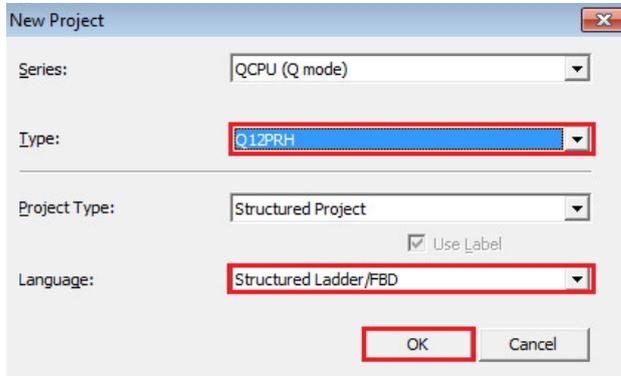
- Start the software GX Works.



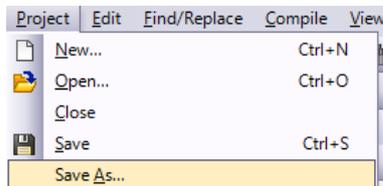
- Create a new project with the menu "Project → New".



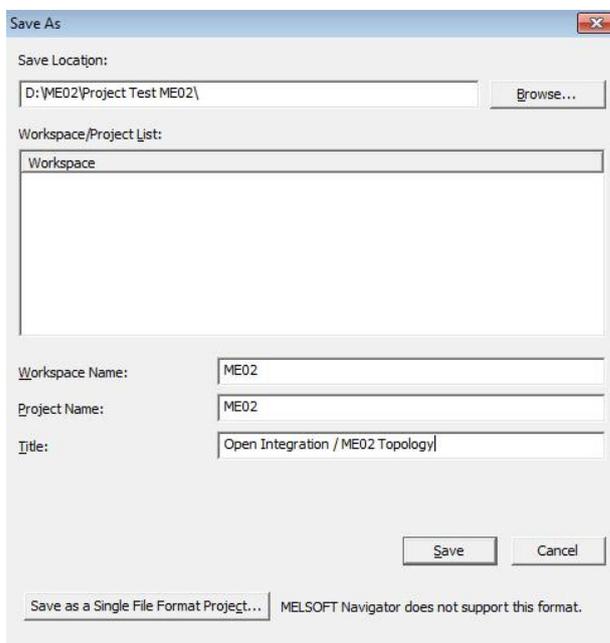
- Configure the controller and the programming language. In this example, the used QCPU type is "Q12PRH".



- Save the project with the menu "Project → SaveAs".

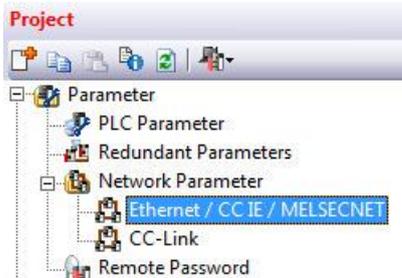


- Fulfill all required fields (Save Location/Workspace Name/Project Name/Title) and click on the button "Save".



3.1.2 Network Parameters

- Double-click on the menu "Network Parameter→Ethernet/CCIE/MELSECNET".



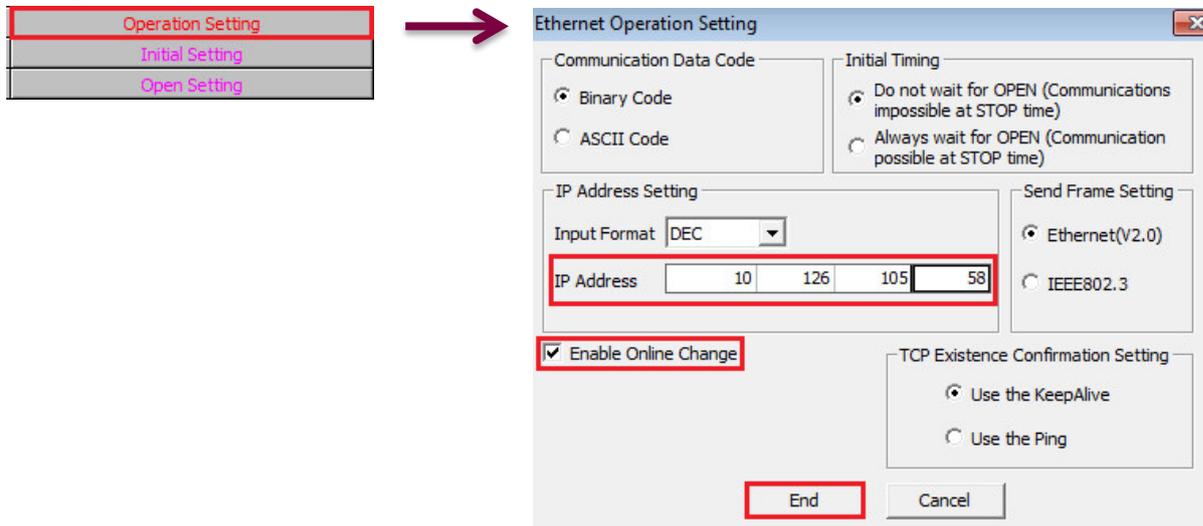
- Following setup window is displayed:

Module 1	
Network Type	None
Start I/O No.	
Network No.	
Total Stations	
Group No.	
Station No.	
Mode	

- Following parameters have been configured for this example:

Module 1	
Network Type	Ethernet (Main Base)
Start I/O No.	0000
Network No.	1
Total Stations	
Group No.	1
Station No.	1
Mode	Online
	Operation Setting
	Initial Setting
	Open Setting
	Router Relay Parameter
	Station No. <->IP Information
	FTP Parameters
	E-mail Setting
	Interrupt Settings
	Redundant Setting

- Click on the text "Operation Setting" and configure the IP address of the main system. In this example, the main system has the IP address 10.126.105.58 and the option "Enable Online Change" has been selected. Click on the button "End" to validate.



Ethernet Operation Setting

Communication Data Code
 Binary Code
 ASCII Code

Initial Timing
 Do not wait for OPEN (Communications impossible at STOP time)
 Always wait for OPEN (Communication possible at STOP time)

IP Address Setting
 Input Format: DEC
 IP Address: 10 126 105 58

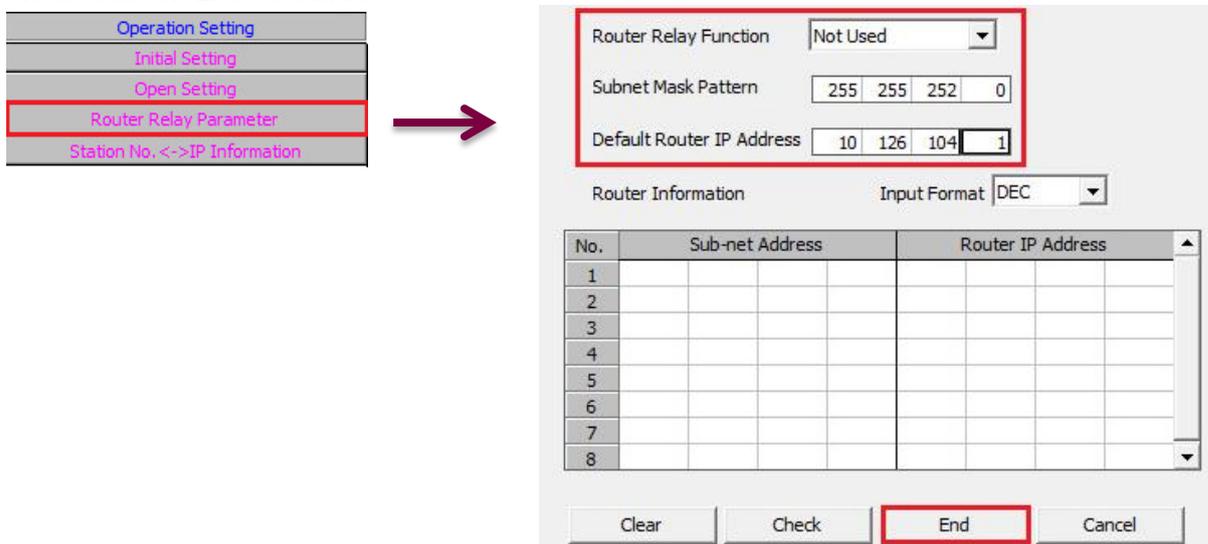
Send Frame Setting
 Ethernet(V2.0)
 IEEE802.3

Enable Online Change

TCP Existence Confirmation Setting
 Use the KeepAlive
 Use the Ping

End Cancel

- Click on the text "Router Relay Parameter" and enter the Network settings. In this example, the subnet mask has the IP address is 255.255.252.0 and the router IP address is 10.126.104.1. Click on the button "End" to validate.



Router Relay Function: Not Used

Subnet Mask Pattern: 255 255 252 0

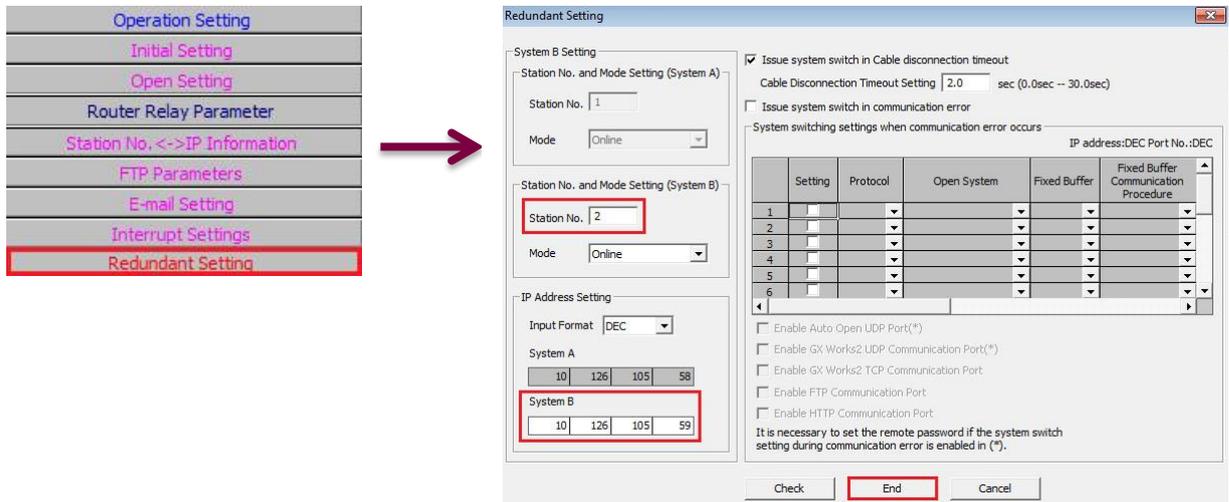
Default Router IP Address: 10 126 104 1

Router Information Input Format: DEC

No.	Sub-net Address	Router IP Address
1		
2		
3		
4		
5		
6		
7		
8		

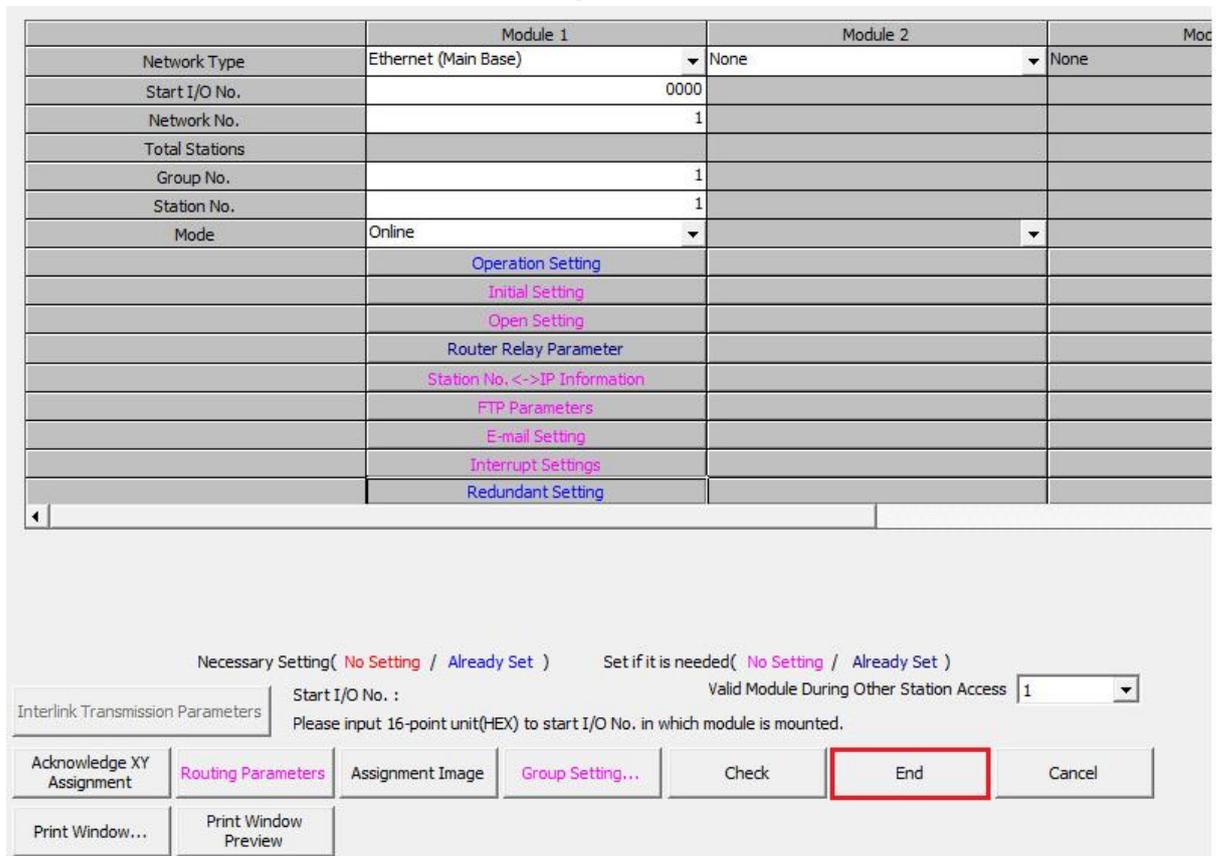
Clear Check End Cancel

- Click on the menu "Redundant Setting". The IP address 10.126.105.59 of the system B is automatically set according to the IP address of system A. However, the system B IP address can be changed. The station number needs to be indicated. In this example, the station number is 2. Click on the button "End" to validate.



The screenshot shows the 'Redundant Setting' dialog box. The 'Station No. and Mode Setting (System B)' section has 'Station No.' set to 2. The 'IP Address Setting' section shows System A with IP 10.126.105.58 and System B with IP 10.126.105.59. The 'End' button is highlighted in red.

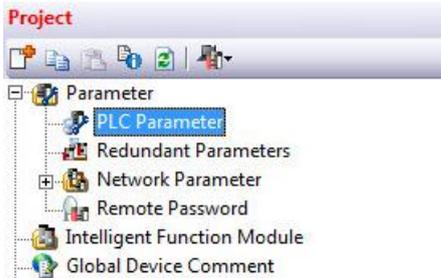
- Click on the button "End" to validate the configuration.



The screenshot shows the 'Interlink Transmission Parameters' dialog box. The 'End' button is highlighted in red. Below the dialog, there are status indicators: 'Necessary Setting (No Setting / Already Set)' and 'Set if it is needed (No Setting / Already Set)'. The 'Valid Module During Other Station Access' is set to 1. At the bottom, there are buttons for 'Acknowledge XY Assignment', 'Routing Parameters', 'Assignment Image', 'Group Setting...', 'Check', 'End', and 'Cancel'. The 'End' button is highlighted in red.

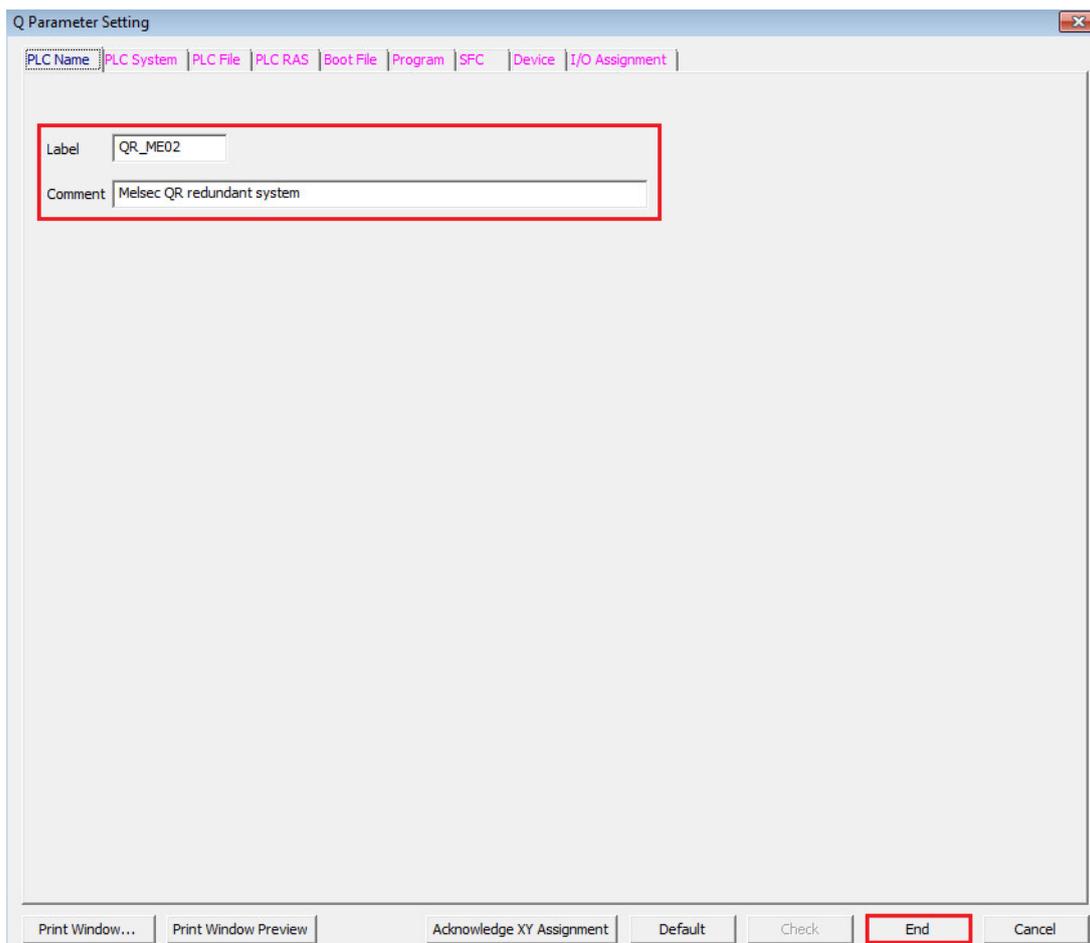
3.1.3 PLC Parameters

- In the project view, double-click on the menu "Parameter → PLC Parameter".



3.1.3.1 PLC Name

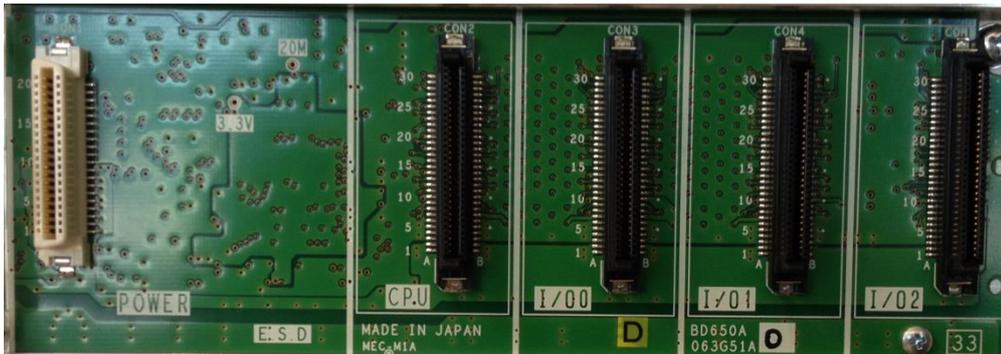
- Select the tab "PLC Name", and then configure the field "Label" and optionally the field "Comment". Click on the button "End" to validate.



3.1.3.2 PLC Hardware Configuration

The PLC slots have to be configured according to the physical setup of modules. In our example we configure this configuration:

System A:



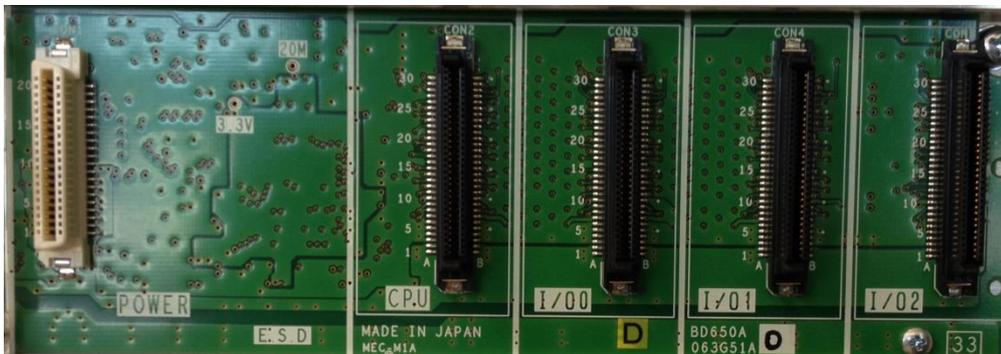
Power Supply
Q63P

PLC
(CPU Slot and Slot 0)
Q12PRHCPU

Slot 1
Ethernet
Module
QJ71E71-100

Slot 2
PROFIBUS
module
QJ71PB92V

System B:



Power Supply
Q63P

PLC
(CPU Slot and Slot 0)
Q12PRHCPU

Slot 1
Ethernet
Module
QJ71E71-100

Slot 2
PROFIBUS
module
QJ71PB92V

- In the "Q Parameter Setting" window, select the tab "I/O Assignment".

PLC Name | PLC System | PLC File | PLC RAS | Boot File | Program | SFC | Device | **I/O Assignment**

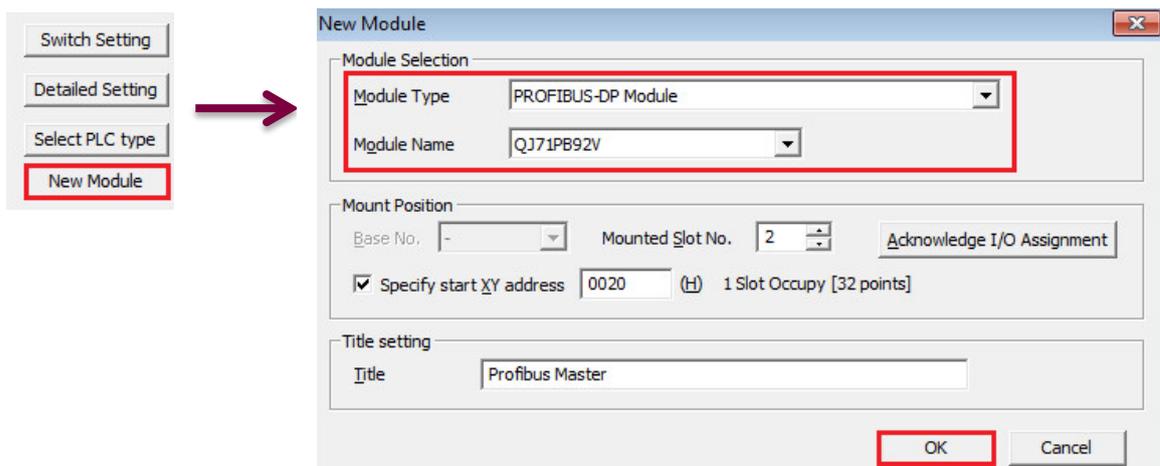
- Slot 1:**

- Select an "Intelligent" module for the Ethernet Module in Slot 1:
- Enter the name "Ethernet module" for the "Model Name".
- Configure 32Points.
- Enter the Start XY address 000

No.	Slot	Type	Model Name	Points	Start XY
0	PLC	PLC			
1	0(0-0)	Redundant		0 Point	
2	1(0-1)	Intelligent	Ethernet module	32Points	0000
3					
4					
5					
6					
7					

- Slot 2:**

- Click on the cell "Type" of the "IO/Assignment Type No. 3" and click on the button "New Module". Select the module Type "PROFIBUS-DP Module".
- Select the module name "QJ71PB92V". Enter a title in the field "Title", which will be indicated in the Project view.
- The settings "Mounted Slot No. : 1" and "Start XY address: 0020" are automatically set to these values. This is well for this hardware configuration.
- Click on the button "OK" to validate.



Switch Setting
Detailed Setting
Select PLC type
New Module

New Module

Module Selection

Module Type: PROFIBUS-DP Module
Module Name: QJ71PB92V

Mount Position

Base No.: - Mounted Slot No.: 2 Acknowledge I/O Assignment

Specify start XY address: 0020 (H) 1 Slot Occupy [32 points]

Title setting

Title: Profibus Master

OK Cancel

- Configured modules overview:
Click on the button "End" to validate and close the window.

Q Parameter Setting

PLC Name | PLC System | PLC File | PLC RAS | Boot File | Program | SFC | Device | I/O Assignment

I/O Assignment(*1)

No.	Slot	Type	Model Name	Points	Start XY
0	PLC	PLC			
1	0(*-0)	Redundant		0 Point	
2	1(*-1)	Intelligent	Ethernet module	32Points	0000
3	2(*-2)	Intelligent	QJ71PB92V	32Points	0020
4	3(*-3)				
5	4(*-4)				
6	5(*-5)				
7	6(*-6)				

Assigning the I/O address is not necessary as the CPU does it automatically.
Leaving this setting blank will not cause an error to occur.

Base Setting(*1)

	Base Model Name	Power Model Name	Extension Cable	Slots
Main				
Ext.Base1				
Ext.Base2				
Ext.Base3				
Ext.Base4				
Ext.Base5				
Ext.Base6				
Ext.Base7				

Base Mode
 Auto
 Detail

8 Slot Default
12 Slot Default
Select module name

Export to CSV File | Import Multiple CPU Parameter | Read PLC Data

(*1)Setting should be set as same when using multiple CPU.

Print Window... | Print Window Preview | Acknowledge XY Assignment | Default | Check | **End** | Cancel

3.1.4 Connection Destination Configuration

There are two options to download the hardware configuration and the software in the PLC: via USB or Ethernet. **In this redundant hardware configuration, the first download will have to be done with the USB interface in both PLCs, followed by a reboot.** The other downloads will automatically be done in both PLCs.

In this example, the first download is done via USB. Then, it is the Ethernet connection which is used to download the other parts of the project configuration.

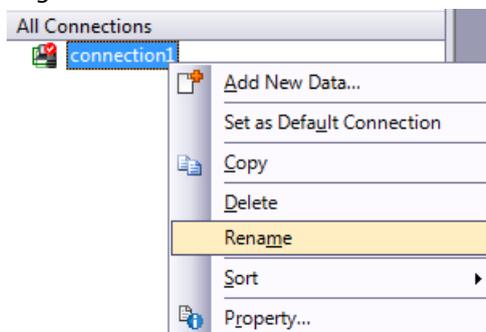
After the described initial download for the redundant settings, an Ethernet download is automatically executed into both PLCs one after another. This simplifies the program download a lot, the redundant PLC "feels" like a normal single PLC in terms of software development.

3.1.4.1 Connection via USB Interface

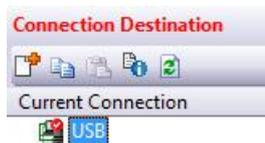
- Connect the USB cable from the PLC USB port to the engineering station one.
- In the Navigation menu, click on the button "Connection Destination".



- In the Connection Destination view:
 - Right-click on the connection "connection1" and select the field "Rename".



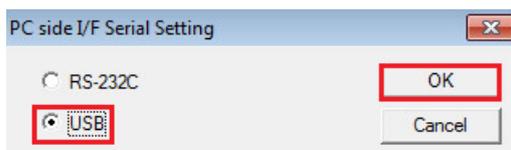
- Enter the connection name "USB".



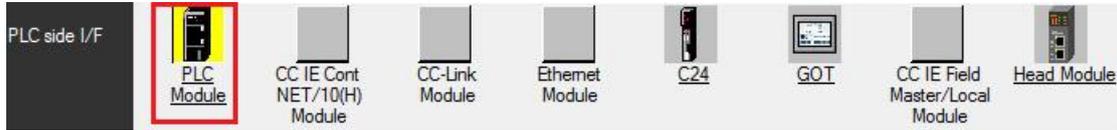
- Double-click on the "USB" connection in order to open the "Transfer Setup" window.
- In the window "Transfer Setup USB", double-click on the PC side I/F icon "Serial USB" text.



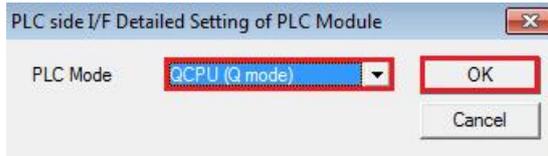
- Select the USB device and click on the button "OK".



- Double-click on the PLC side I/F icon “PLC Module” text.



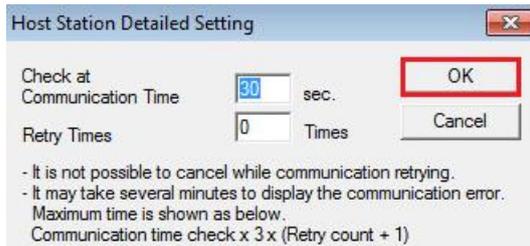
- Select the PLC Mode “QCPU (Q mode)” and click on the button “OK”.



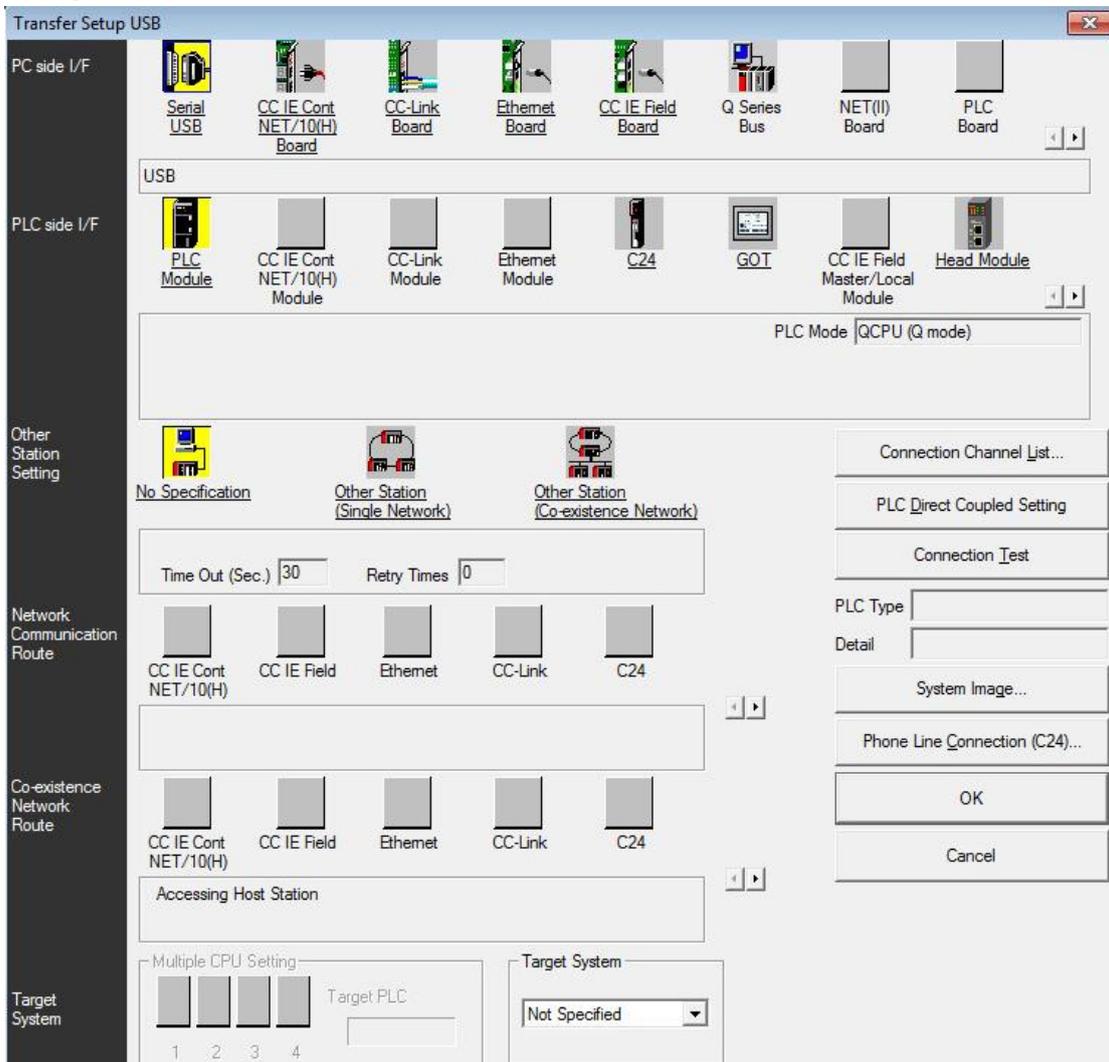
- Double-click on the text option “No specification” in the menu “Other Station Setting”.



- Verify default settings and click on the button “OK”.



- Configured "USB" connection:



- Check the connection between PC and PLC by using the button "Connection Test". If successful, following message is displayed. Click on the button "OK".



- Click on the button "OK" to close the window "Transfer Setup USB".

3.1.4.2 IP Settings Configuration Download via USB

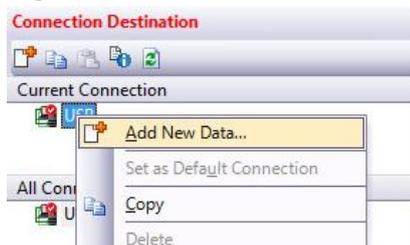
- Download the IP configuration in the PLC.
→ Refer to part 3.4.2 and 3.4.3 to proceed.

Notes :

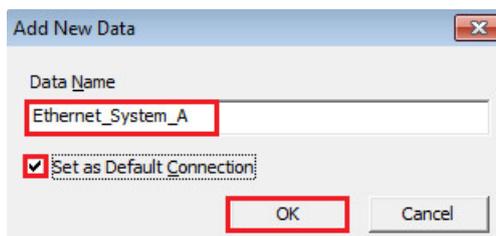
- Just the part "PLC Module" is downloaded in this step.

3.1.4.3 Connection via Ethernet Board to System A

- Connect the Ethernet cable from the PLC port/HUB to the engineering network one.
- In the Navigation menu, click on the button "Connection Destination".
- Create a new connection configuration:
 - Right-click on the connection "USB" and select the option "Add New Data".



- Enter the name of the new connection, ie "Ethernet_System_A" and cross the checkbox "Set as Default Connection".



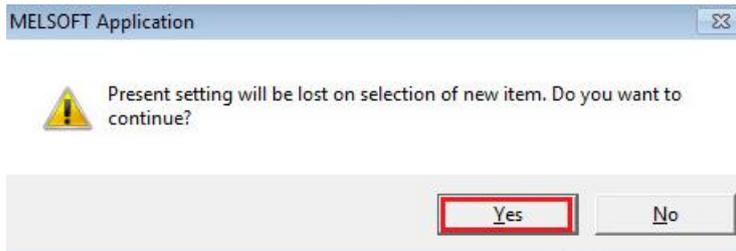
- The new connection is displayed in the fields "Current Connection" and "All Connections".



- Double-click on the “Ethernet_System_A” connection in order to open the “Transfer Setup” window. Double-click on the PC side I/F icon “Ethernet Board” text.



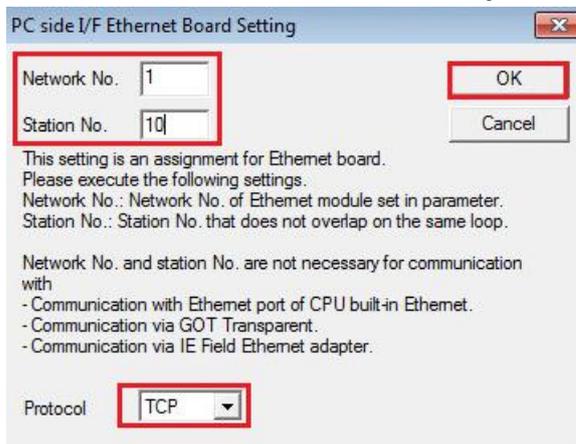
- MELSOFT Application message is displayed. Click on the button “Yes”.



- Double-click again on the PC side I/F icon “Ethernet Board” text.



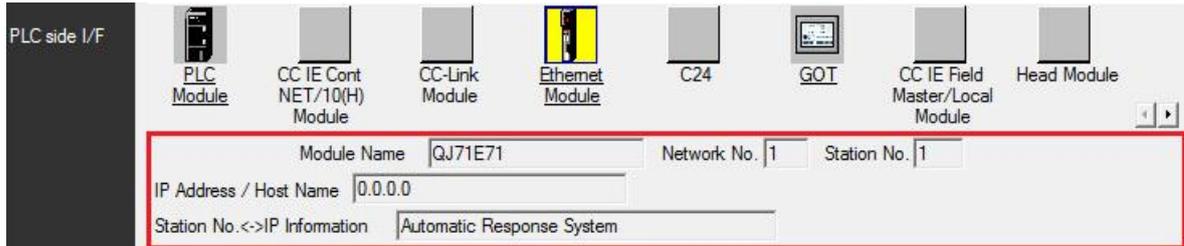
- Configure the “Station Number” to the value 10 for this example (The PC side Station number must be different as the PLC one) and verify that the Network Number corresponds to this one set in the Network Parameters. Then verify that TCP protocol is selected. Click on the button “OK”.



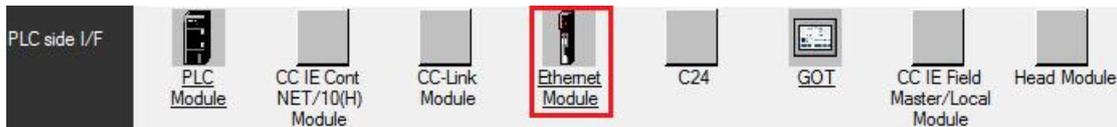
- Double-click on the PLC I/F side icon “Ethernet Module” text.



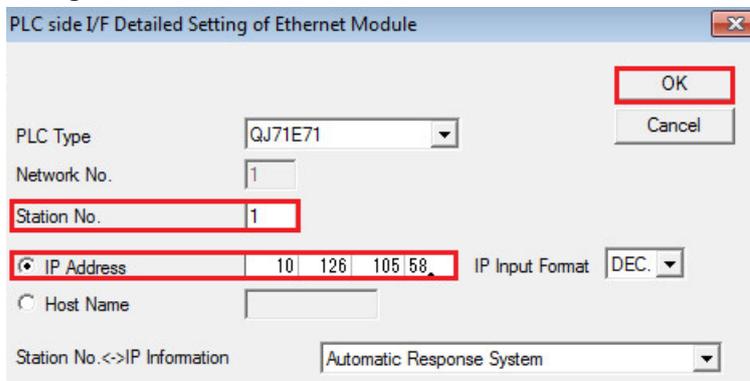
- This displays the network settings of the PLC:



- Double-click again on the PLC side I/F icon “Ethernet Module” text.



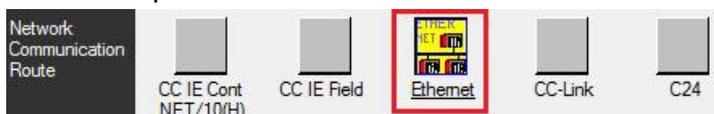
- Enter the Station Number 1 and the IP address 10.126.105.58 of the main PLC, which has been configured one in the Network Parameters. Click on the button “OK” to close this window.



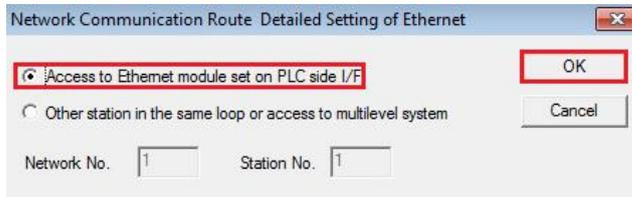
- Select the option “Other Station”.



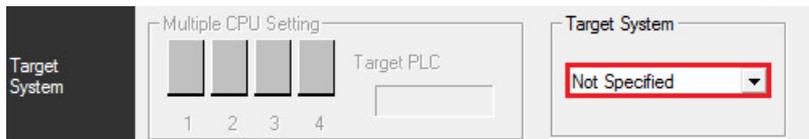
- Select the option “Ethernet”.



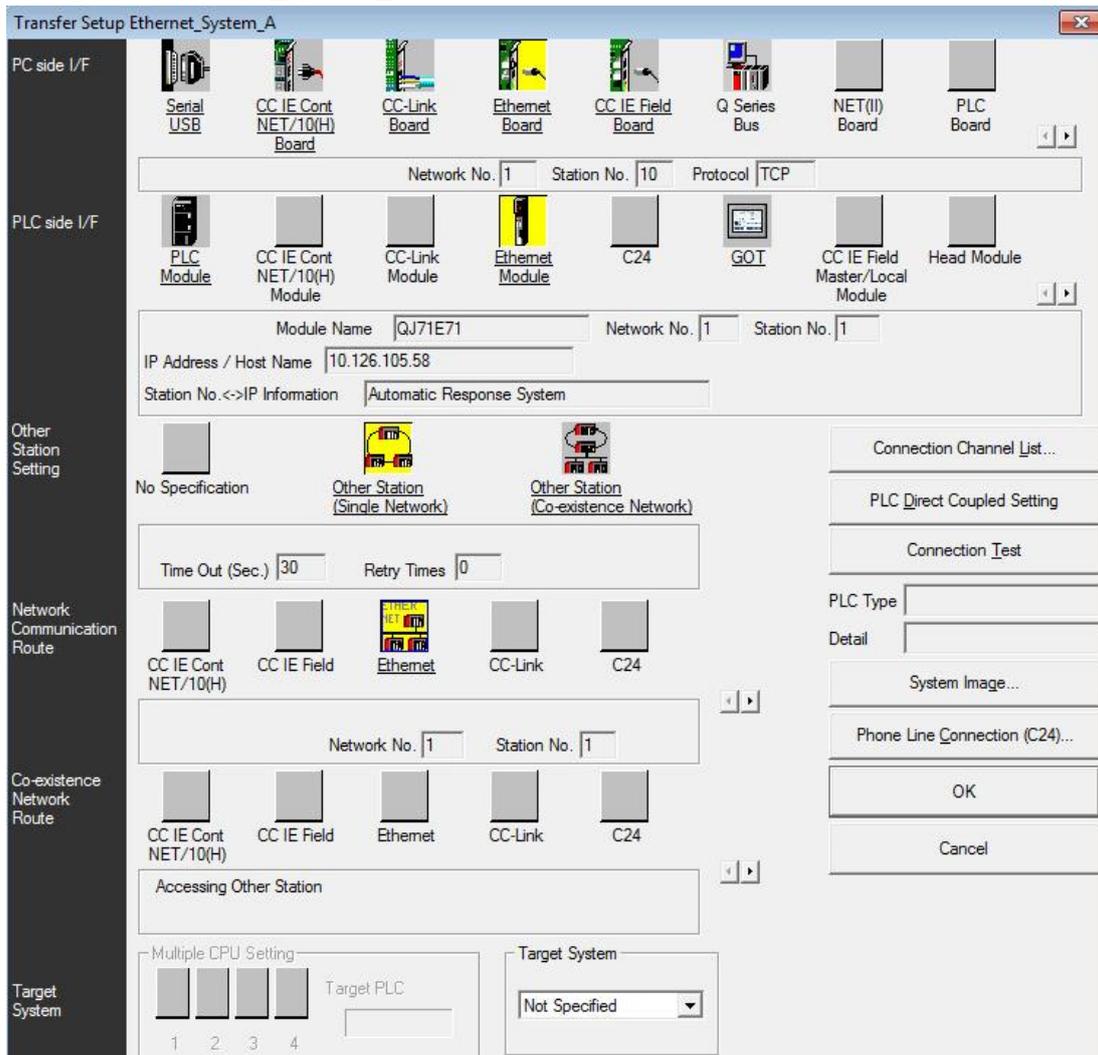
- Verify that following setting is set and click on the button to validate:



- Verify that the Target System is configured as "Not Specified" in order to download the program in both PLCs.



- Configured "Ethernet_System_A" connection:



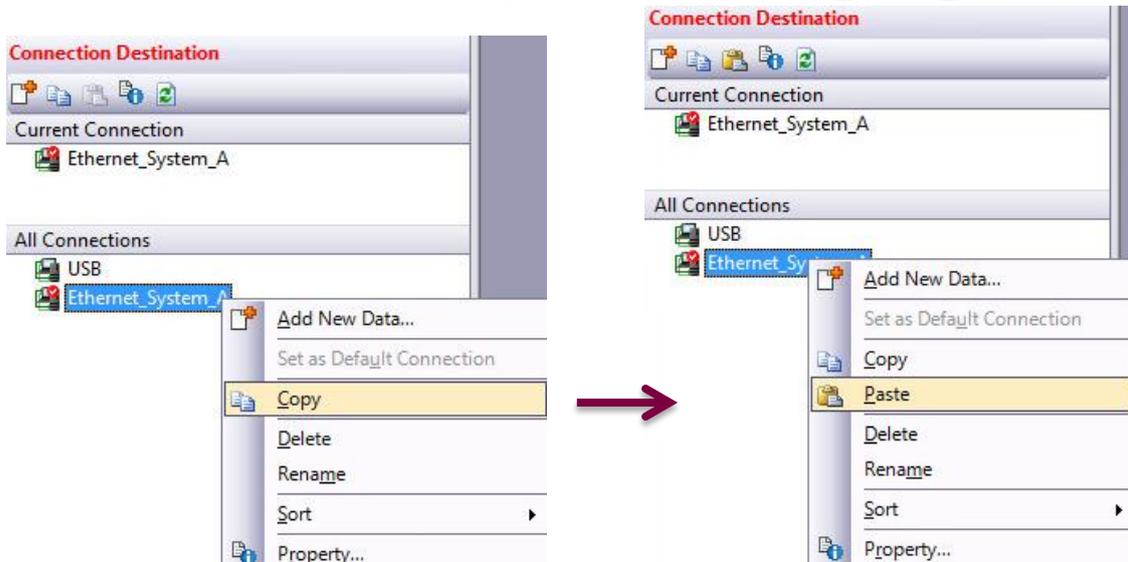
- Check the connection between PC and PLC by using the button "Connection Test". If successful, following message is displayed. Click on the button "OK".



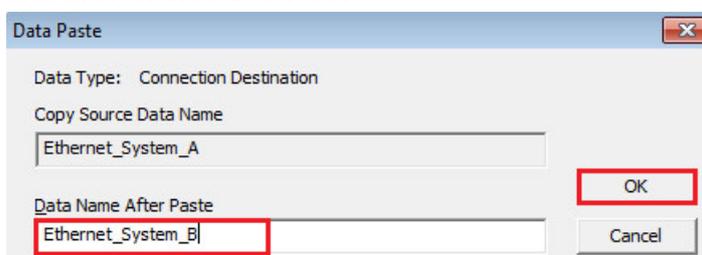
- Click on the button "OK" to close the window "Transfer Setup Ethernet_System_A".

3.1.4.4 Connection via Ethernet Board to System B

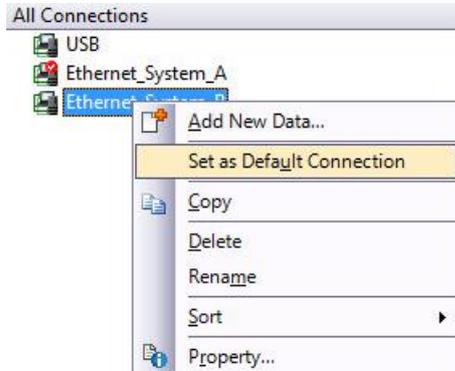
- In the Connection Destination view, copy the connection "Ethernet_System_A" and paste it.



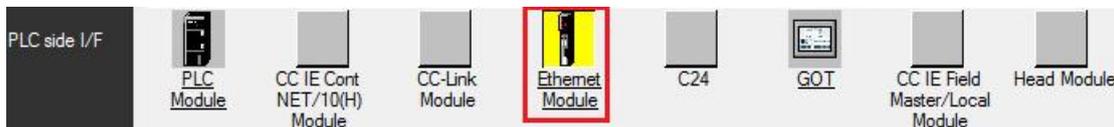
- Enter the new name, for example "Ethernet_System_B", which corresponds to the redundant PLC and click on the button "OK".



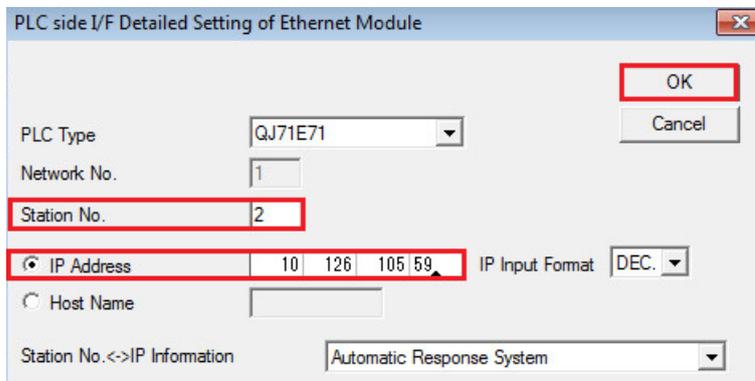
- Right-click on the connection "Ethernet_System_B" and choose the option "Set as Default Connection".



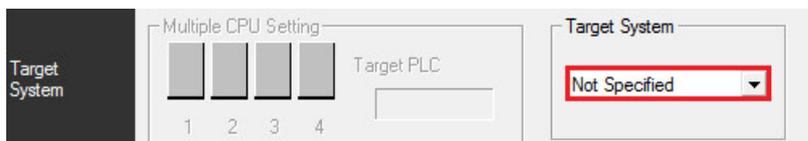
- Double-click on the connection "Ethernet_System_B" and Double-click on the PC side I/F icon "Ethernet Module" text:



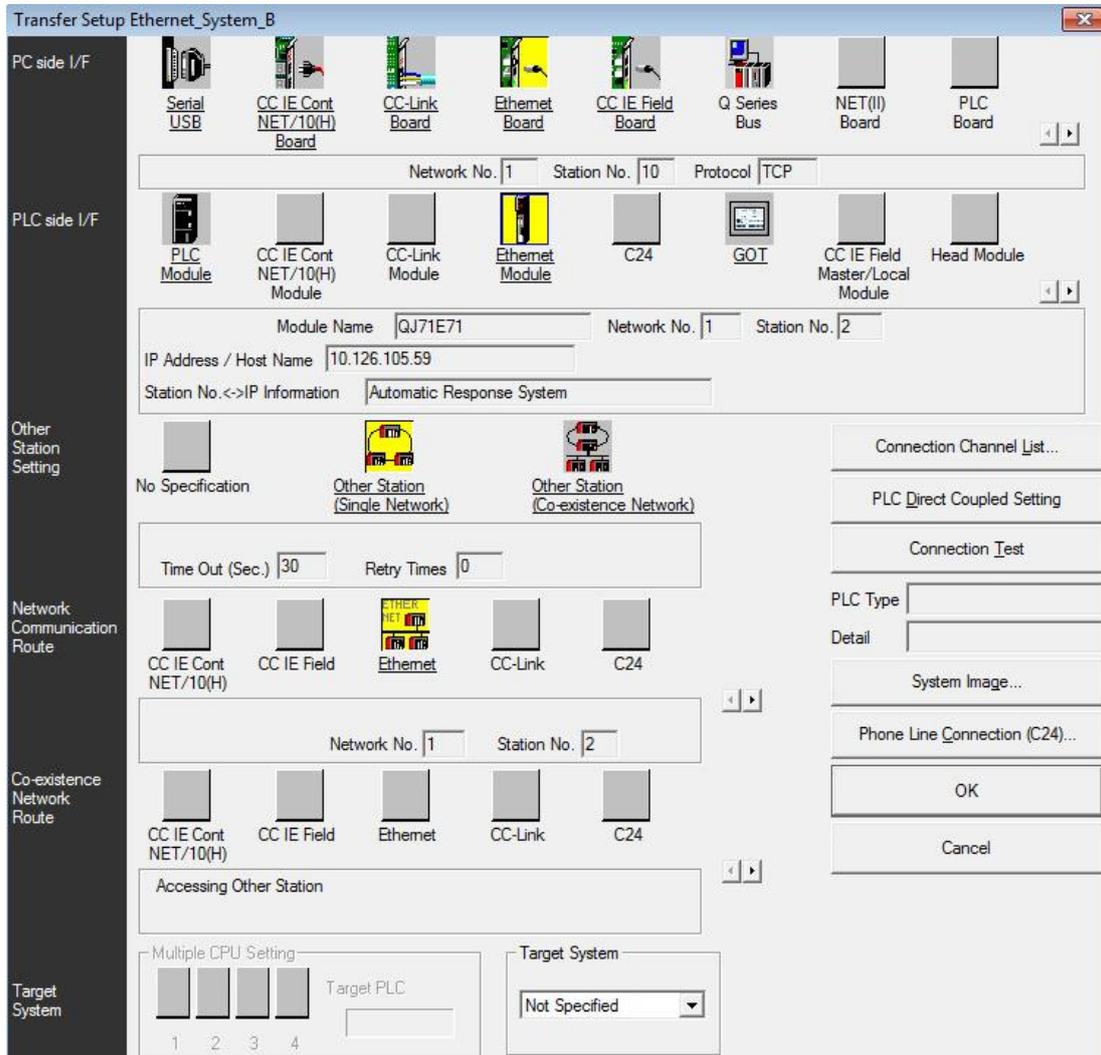
- Enter the Station Number 2 and set the IP address 10.126.105.59 according the Network Parameters. Click on the button "OK" to validate:



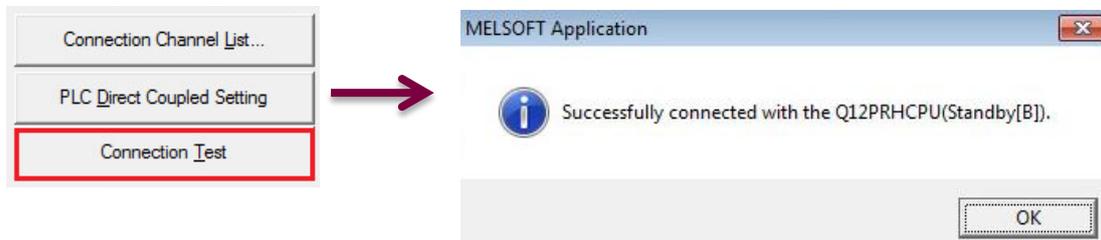
- Verify that the Target System is configured as "Not Specified" in order to download the program in both PLCs.



- Configured Ethernet_System_B connection:



- Check the connection between PC and PLC by using the button "Connection Test". If successful, following message is displayed. Click on the button "OK".

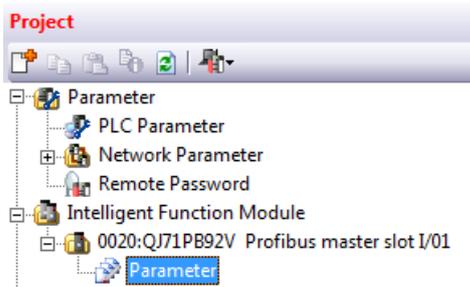


- Click on the button "OK" to close the window "Transfer Setup Ethernet_System_B".

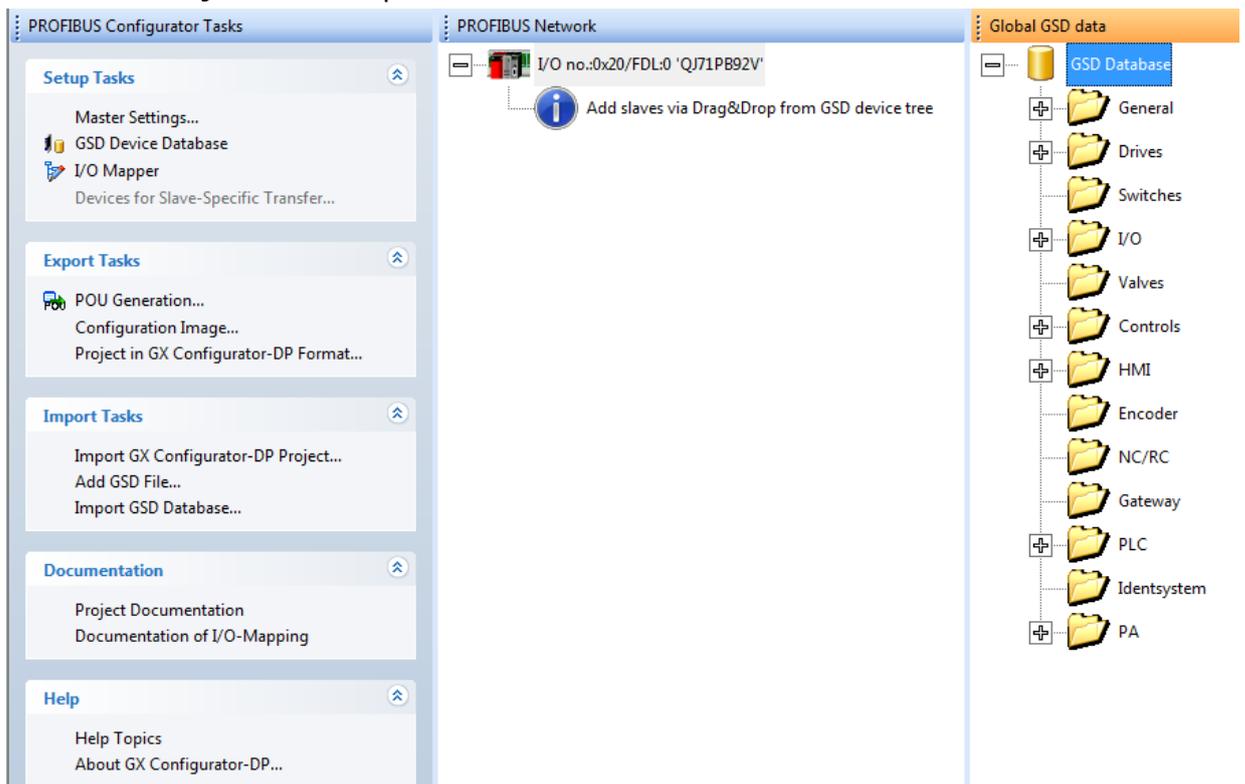
3.2 Field Network Configuration

In this part is explained how to configure the PROFIBUS master interface and how to import the Remote IO GSD file in the GSD database.

- In the Project view, double-click on the PROFIBUS module menu "0020:QJ71PB92V→Parameter".

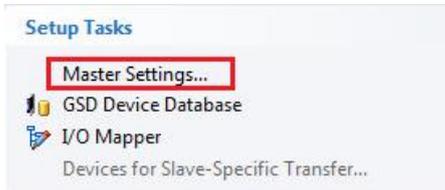


- The tab 0020:QJ71PB92V is opened:

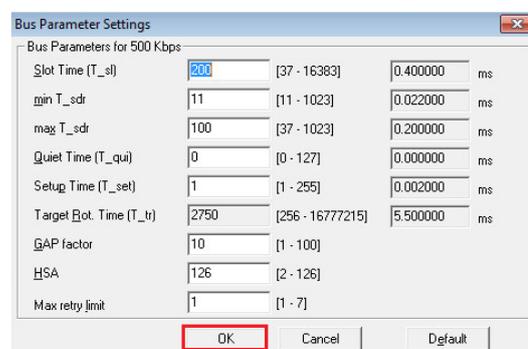
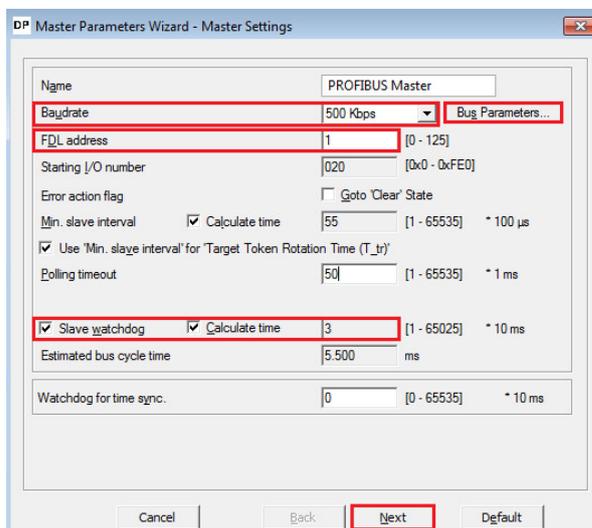


3.2.1 PROFIBUS DP Master Configuration

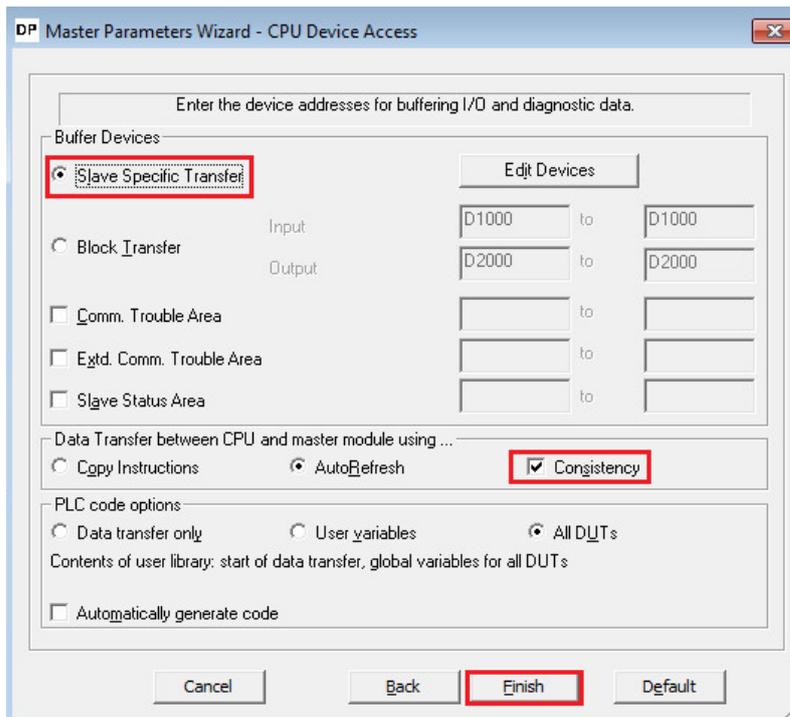
- Select the menu “PROFIBUS Configurator Tasks → Setup Tasks → Master Settings...”.



- In the window “Master Parameters Wizard-Master Settings”:
 - Set the Baud rate to 500 kbps (specific for this example).
 - Available Baud rates: 9.6k/19.2k/93.75k/187.5k/500k/1.5M/3M/6M/12M.
 - Set the FDL address to 1 (specific for this example).
 - Select the parameter “Slave watchdog” and “Calculated time”.
 - The watchdog time can be configured manually if needed. Unselect the parameter “Calculated time” and indicate the value in the corresponding field.
 - Click on the button “Bus Parameters”:
 - The window “Bus Parameter Settings” is displayed.
 - All timing parameters are calculated automatically according to the configured devices.
 - Click on the button “OK”.
 - Click on the button “Next”.



- Check the following settings in the window “Master Parameters Wizard – CPU Device Access”:
 - Select the option “Slave Specific Transfer”.
 - “AutoRefresh” and “Consistency” are selected.
 - Input address is set to D1000.
 - Output address is set to D2000.
 - Click on the button “Finish”.



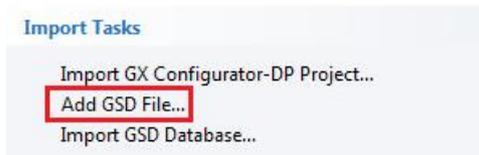
Notes:

- The Baud rate has to correspond to this used by all slaves. If the Baud rate doesn't match with one slave, an error will be indicated but only during the compilation of the configuration.
- The settings “Bus Parameters” as watchdog or timing parameters depends on the complete PROFIBUS network configuration.

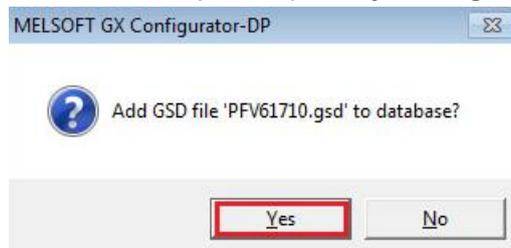
3.2.2 GSD File

3.2.2.1 GSD File Import

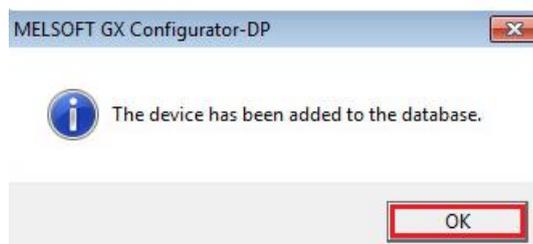
- Select the menu “PROFIBUS Configurator Tasks → Import Tasks → Add GSD File”.



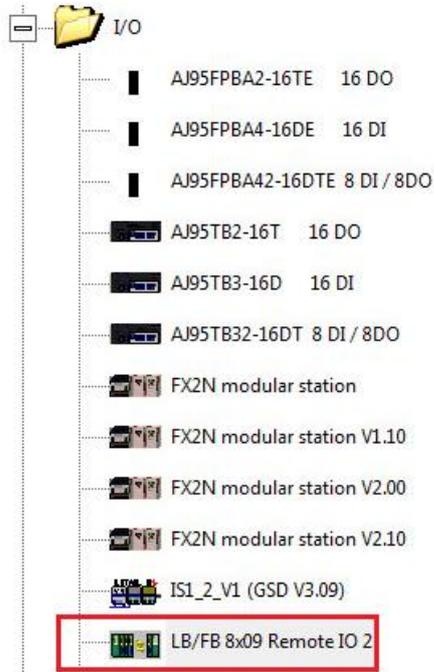
- The browser is opened:
 - Indicate the path of the stored GSD file EH3x1562 (specific to the Pepperl+Fuchs Remote IO Com Unit).
 - Confirm the import request by clicking on the button “Yes”.



- If successfully imported, following message is displayed:



- The GSD file is now imported in the “Global GSD database” (orange tab).



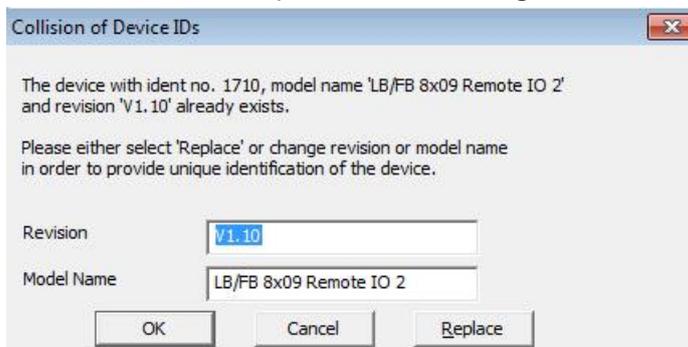
Notes:

- The GSD file is imported automatically in the “Project GSD database” when a new slave is added in the PROFIBUS network.

3.2.2.2 GSD Revision Installation

The GSD database allows the installation of multiple GSD files revisions but the model name will have to be changed.

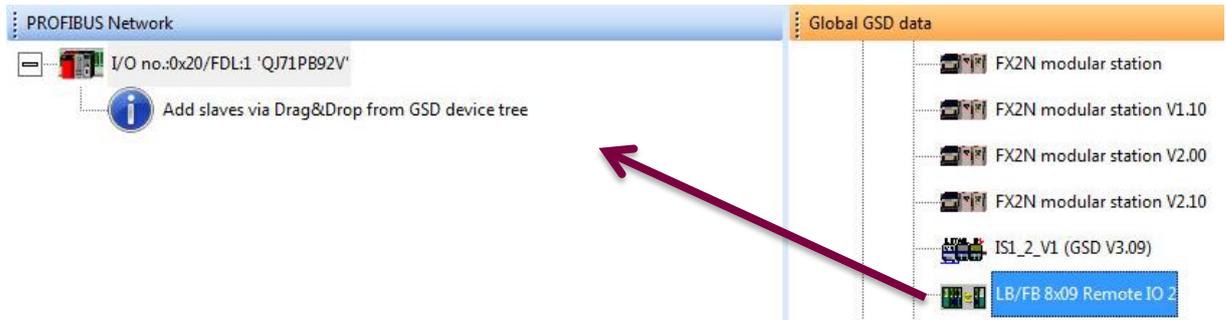
- Import the GSD revision file following the same steps as in part “GSD File import”.
- The GSD file is not imported but following window is displayed:



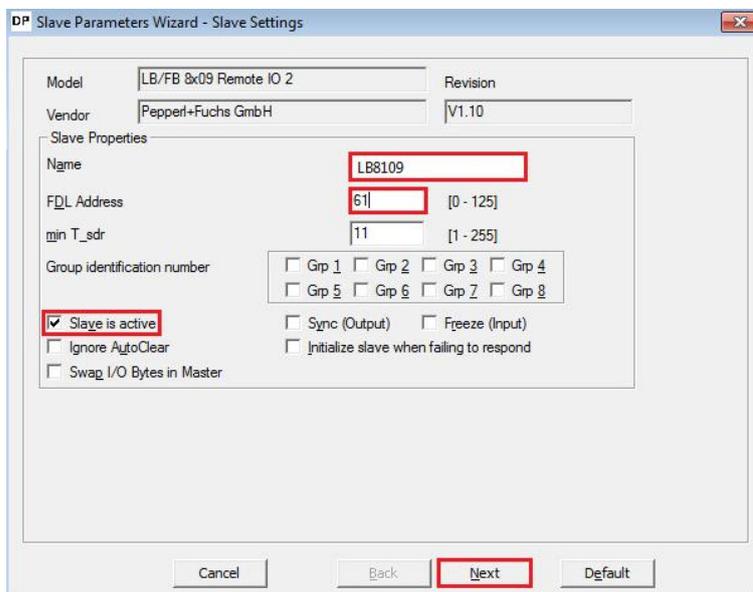
- Change the field “Model Name” and click on the button “OK”.

3.2.3 Pepperl+Fuchs Remote IO Slave Configuration

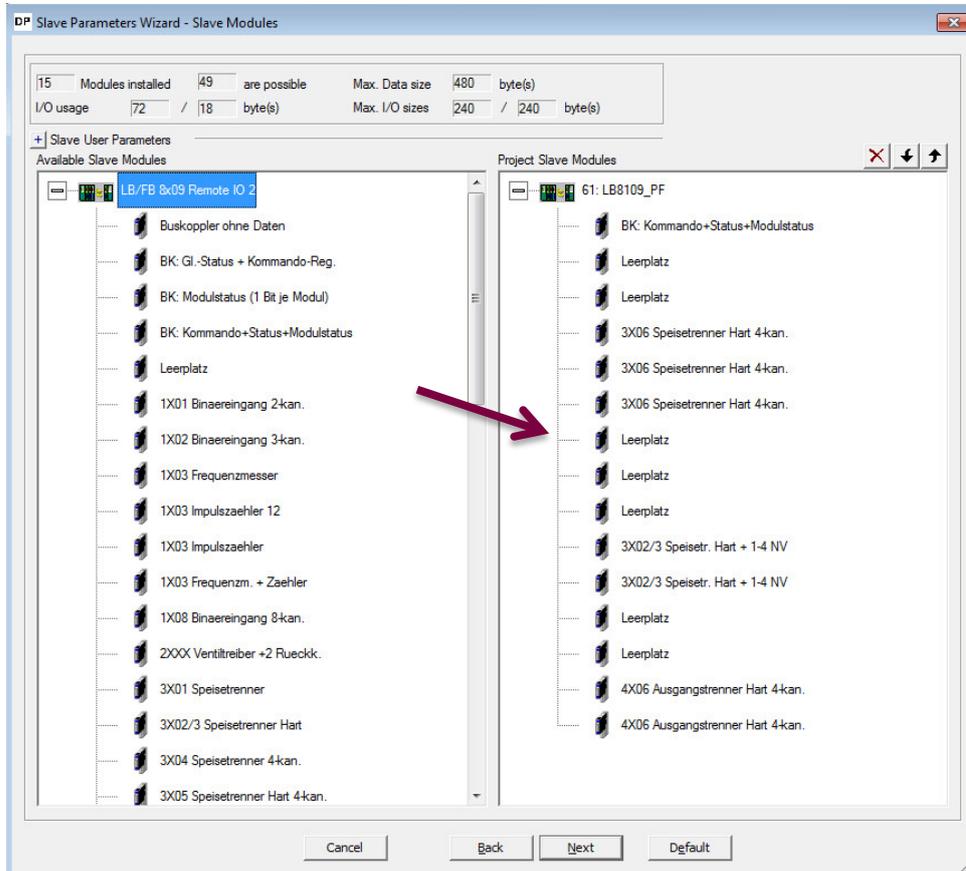
- In the menu "Global GSD data", select the device "LB/FB 8x09 Remote IO 2" in the GSD database.
- Drag and drop it in the "PROFIBUS Network" window".



- The slave configuration window is immediately displayed. In the "Slave Properties" menu:
 - Specify:
 - The name of the slave: LB8109 (specific for this example).
 - The FDL Address : 61 (specific for this example).
 - The parameter "min_T_sdr" is automatically imported.
 - Verify that the checkbox "Slave is active" is crossed.
 - Click on the button "Next".



- The next window shows a configuration example of the module(s). Drag and drop following modules from the left to the right window then click on the button "Next".



- There exist five different LB3102 configuration types according to the GSD file:

```

Module = "3X02/3 Speisetrenner Hart" 0x50
15
SubSys_Module_Dir_Index(1) = 200
EndModule

Module = "3X02/3 Speisetr. Hart + 1 NV" 0x52
34
SubSys_Module_Dir_Index(1) = 200
EndModule

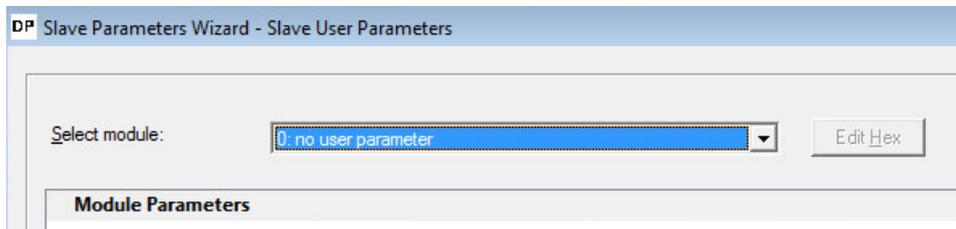
Module = "3X02/3 Speisetr. Hart + 1-2 NV" 0x54
35
SubSys_Module_Dir_Index(1) = 200
EndModule

Module = "3X02/3 Speisetr. Hart + 1-3 NV" 0x56
36
SubSys_Module_Dir_Index(1) = 200
EndModule

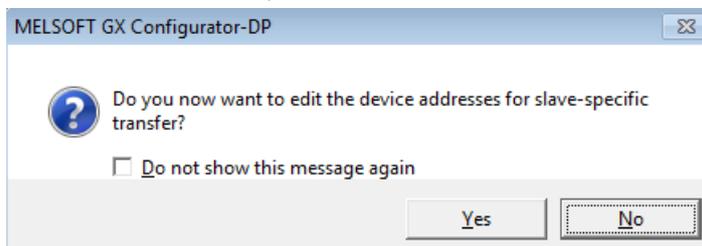
Module = "3X02/3 Speisetr. Hart + 1-4 NV" 0x58
37
SubSys_Module_Dir_Index(1) = 200
EndModule
  
```

The configuration of the card type LB3102 on the PROFIBUS master side has to match with these done on the PROFIBUS Slave side, e.g. chapter 5.2.3.

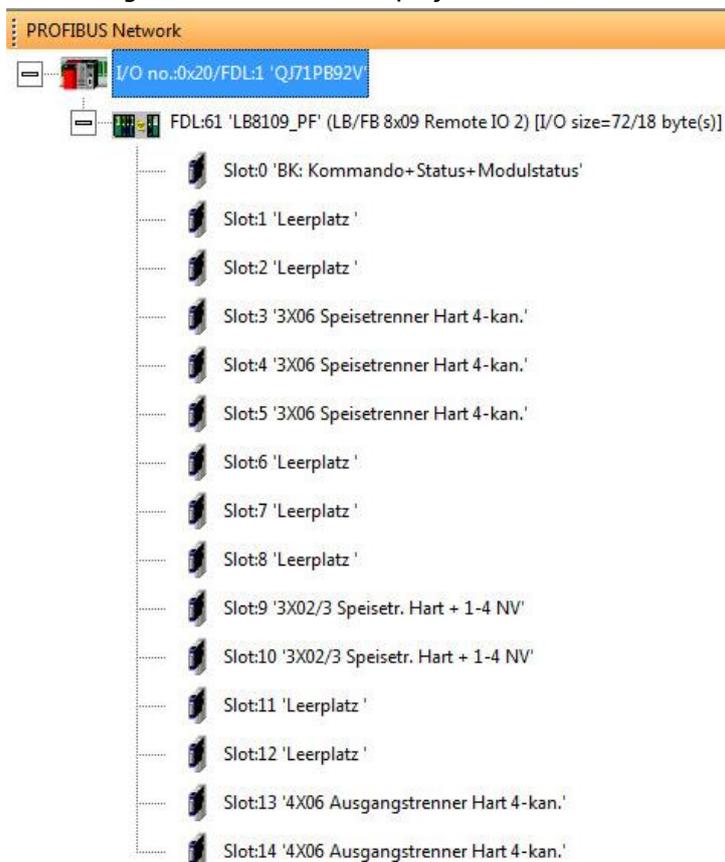
- The window "Slave User Parameters" is displayed. Select the field "0: no user parameter" (specific for this device) and click on the button "Finish".



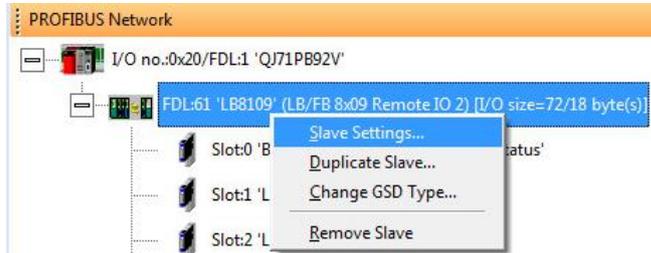
- The following window is displayed. Click on the button "No" (This step will be done after the variables declaration).



- The configured slave is now displayed in the PROFIBUS network.



- The configured slave settings can be updated. Right-click on the Remote IO in the PROFIBUS network view and select the option “Slave Settings”.



Notes :

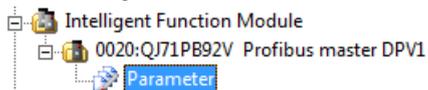
All information related to the modules allocation and slot definitions are described in the GSD file PFV6170.

- A wrong module allocation configuration will not be indicated.
- A wrong configuration can be downloaded in the PLC, but the cyclic data exchange mode will not be established.

3.2.4 Specific Slave Buffer Device

This part explains how to address the inputs/outputs addresses to the PROFIBUS slave device.

- In the Project view, double-click on the menu “0020:QJ71PB92V →Parameter”.



- Select the menu “Setup Tasks→Devices for Slave-Specific Transfer ...” .

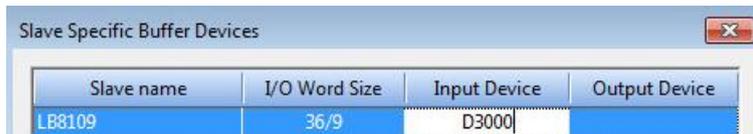


- Following window is displayed:



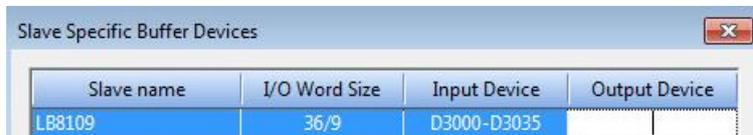
Slave na...	I/O Word Size	Input Device	Output Device
LB8109	36/9		

- Click on the field "Input Device" and set the address D3000 for this example.



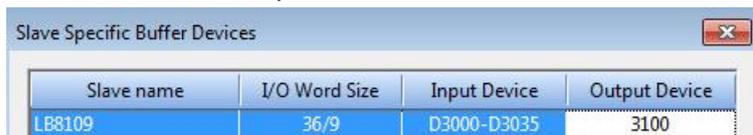
Slave name	I/O Word Size	Input Device	Output Device
LB8109	36/9	D3000	

- The field is automatically updated according to the amount of configured inputs modules in chapter 3.2.1.



Slave name	I/O Word Size	Input Device	Output Device
LB8109	36/9	D3000-D3035	

- Click on the field "Output Device" and set the address D3100 for this example.



Slave name	I/O Word Size	Input Device	Output Device
LB8109	36/9	D3000-D3035	3100

- The field is automatically updated according to the amount of configured outputs modules in chapter 3.2.1.



Slave name	I/O Word Size	Input Device	Output Device
LB8109	36/9	D3000-D3035	D3100-D3108

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

3.3 Mapping of Process Values and Status to Control Strategy

This part describes how to implement the logic which handles the received data.

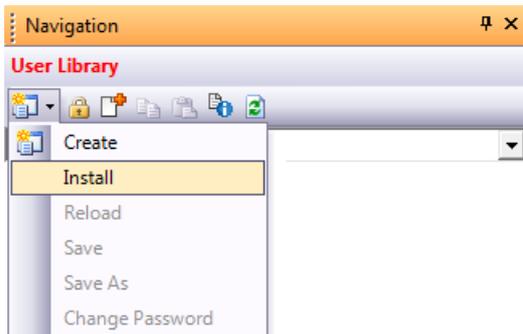
3.3.1 Library Import

- Two libraries provided by Mitsubishi Electric need to be imported in the project:
 - The library "QJ71PB92V_0020" for PROFIBUS communication handling.
 - The library "Profibus_LB_serie" for PROFIBUS data handling.

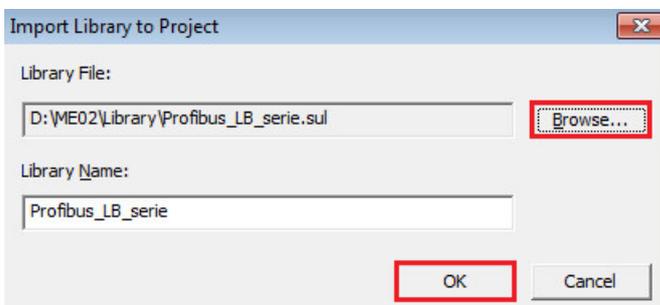
- In the Navigation menu, click on the button "User Library".



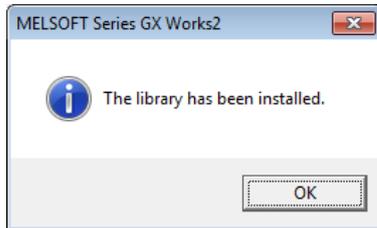
- Select the 1st shortcut in the user library and click on the menu "Install".



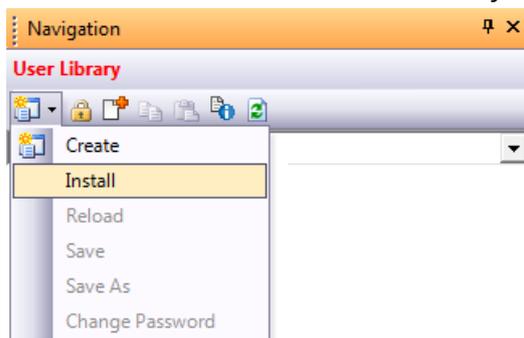
- Click on the button "Browse" to look for the library "Profibus_LB_serie" and then on the button "OK".



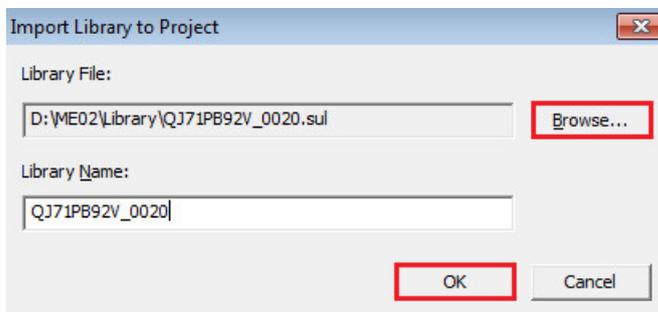
- Message is displayed when the library is installed.



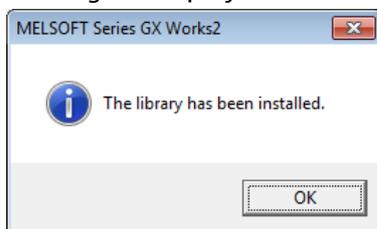
- Select the 1st shortcut in the user library and click on the menu "Install".



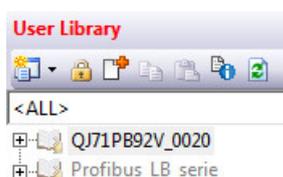
- Click on the button "Browse" to look for the library "QJ71PB92V_0020" and then on the button "OK".



- Message is displayed when the library is installed.



- Both libraries are now part of the project.



3.3.2 Create a Program

This part describes how to create a program, insert a function block and assign the corresponding variables.

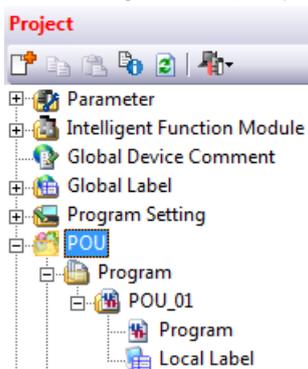
This example describes several function blocks used in the communication between PLC and Pepperl+Fuchs Remote IO:

- Function block giving the status of the LB8109 Bus Controller.
- Function block converting PROFIBUS data received from Remote IO card LB3106.
- Function blocks converting PROFIBUS data received from Remote IO card LB3102.
- Function block converting PROFIBUS data received from Remote IO card LB4106.

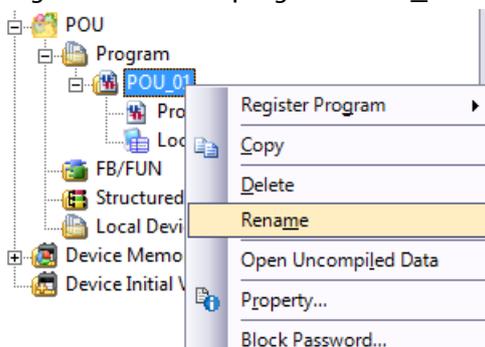
3.3.2.1 POU Configuration

In this part, the name of the default POU is changed and a new one is added.

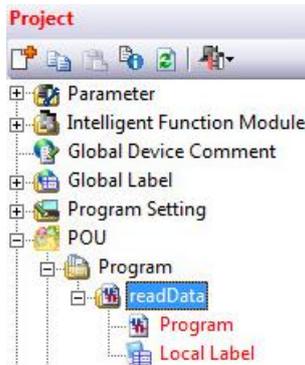
- In the Project view, expand the “POU” part.



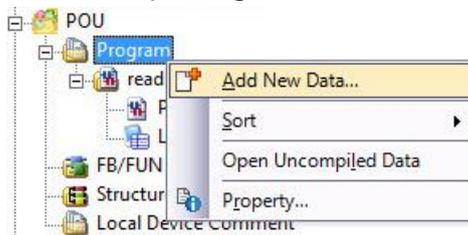
- Right-click on the program “POU_1” and select the menu “Rename”.



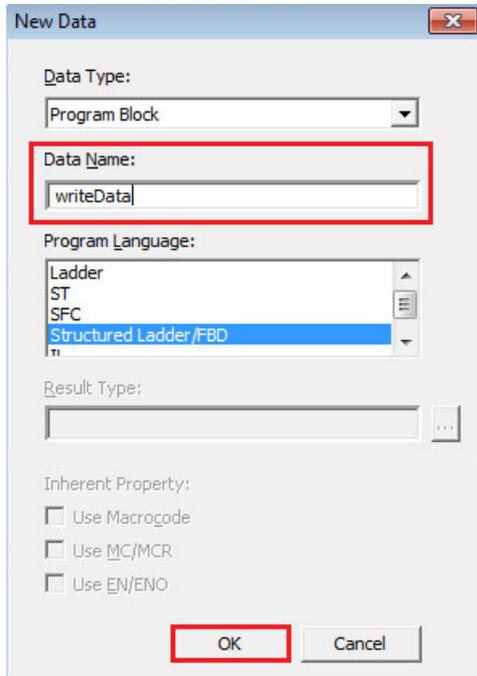
- Enter the new program name "readData".



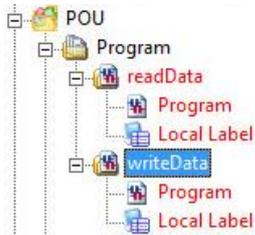
- In the POU part, right-click on the menu "Add New Data..."



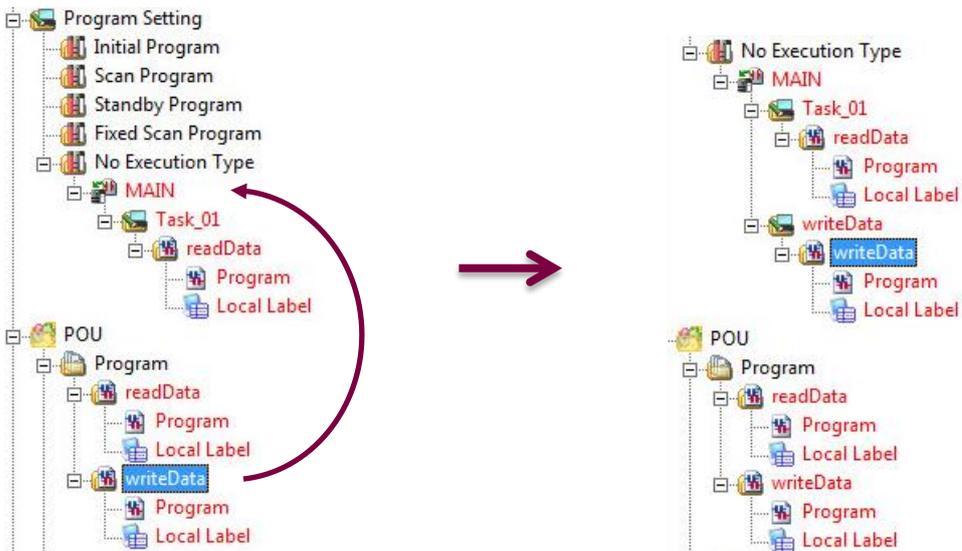
- Enter the new program name "writeData" in the field "Data Name" and click on the button "OK".



- The new part has been added:



- In the menu "Program", select the data "writeData", then drag and drop it in the part "MAIN".



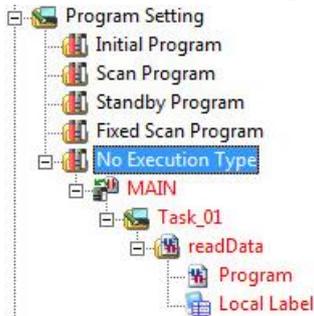
Notes:

- The new configuration is written in red because it still has not been compiled.

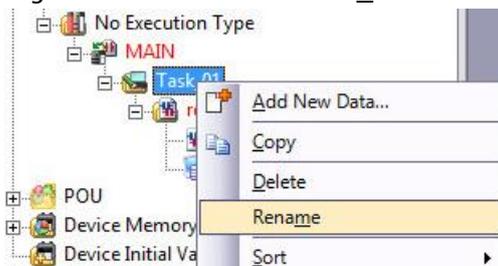
3.3.2.2 Program Setting Configuration

In this part, the task is renamed and moved to the "Scan Program" part.

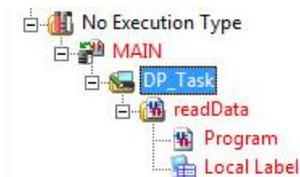
- Expand the menu "Program Setting→No Execution Type".



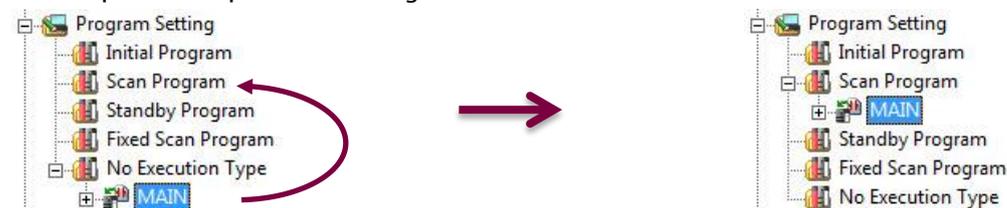
- Right-click on the task "Task_01" and select the menu "Rename".



- Enter a new task name "DP_Task".



- In the menu "Program Setting", select the data "Main" in the part "No Execution Type", then drag and drop it in the part "Scan Program".



3.3.2.3 Variables Declaration

Global and Local variables, which are used in the program, are declared in this chapter.

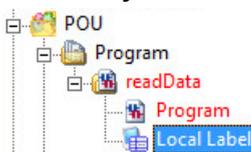
- In the Project view, double-click the menu “Global Label→Global”.



- The following example displays the required variables used for function block data type “StatusCheck_PF”, “LB3106”, “LB3102_4HART” and “LB4106”.

	Class	Label Name	Data Type
1	VAR_GLOBAL	status_LB8109	Bit
2	VAR_GLOBAL	outputValue_LB3106_1_CH1	FLOAT (Single Precision)
3	VAR_GLOBAL	outputValue_LB3106_1_CH2	FLOAT (Single Precision)
4	VAR_GLOBAL	outputValue_LB3106_1_CH3	FLOAT (Single Precision)
5	VAR_GLOBAL	outputValue_LB3106_1_CH4	FLOAT (Single Precision)
6	VAR_GLOBAL	lineFault_LB3106_1_CH1	Bit
7	VAR_GLOBAL	outputValue_LB3102_1	FLOAT (Single Precision)
8	VAR_GLOBAL	outputValue_LB3102_1_PV	FLOAT (Single Precision)
9	VAR_GLOBAL	outputValue_LB3102_1_SV	FLOAT (Single Precision)
10	VAR_GLOBAL	outputValue_LB3102_1_TV	FLOAT (Single Precision)
11	VAR_GLOBAL	outputValue_LB3102_1_QV	FLOAT (Single Precision)
12	VAR_GLOBAL	lineFault_LB3102_1	Bit
13	VAR_GLOBAL	outputValue_LB4106_1	Word[Unsigned]/Bit String[16-bit](0..3)
14	VAR_GLOBAL	PV_LB4106_1_CH1	FLOAT (Single Precision)
15	VAR_GLOBAL	PV_LB4106_1_CH2	FLOAT (Single Precision)
16	VAR_GLOBAL	PV_LB4106_1_CH3	FLOAT (Single Precision)
17	VAR_GLOBAL	PV_LB4106_1_CH4	FLOAT (Single Precision)
18	VAR_GLOBAL	lineFault_LB4106_1_CH1	Bit
19	VAR_GLOBAL	lineFault_LB4106_1_CH2	Bit
20	VAR_GLOBAL	lineFault_LB4106_1_CH3	Bit
21	VAR_GLOBAL	lineFault_LB4106_1_CH4	Bit

- Save the changes.
- In the Project view, double click the menu “POU→Program→readData→ LocalLabel”.



- Declare the required local variables related to the function blocks:

	Class	Label Name	Data Type
1	VAR	StatusCheck_PF_1	StatusCheck_PF
2	VAR	LB3106_1	LB3106
3	VAR	LB3102_4HART_1	LB3102_4HART

- Save the changes.

- In the Project view, double click the menu "POU→Program→writeData→ LocalLabel".



- Declare the required local variable related to the function block LB4106:

	Class	Label Name	Data Type
1	VAR	LB4106_1	LB4106

- Save the changes.

3.3.2.4 PROFIBUS Input/Output Data Assignment

The assignment of PROFIBUS data addresses on the function blocks is depending on the hardware configuration of the Pepperl+Fuchs Remote IOs. Following table shows the PROFIBUS data input/output addresses according the IO modules configuration done in chapter 3.2.3 and according to the Specific Slave device configuration done in chapter 3.2.4. Theses addresses are used in the logic.

	PROFIBUS Inputs		PROFIBUS Ouputs	
	Bytes Amount	Addresses (Word registers)	Bytes Amount	Addresses (Word registers)
LB8109	8	D3000-D3003	2	D3100
LB3106 Card 1 Channel 1	2	D3004		
LB3106 Card 1 Channel 2	2	D3005		
LB3106 Card 1 Channel 3	2	D3006		
LB3106 Card 1 Channel 4	2	D3007		
LB3106 Card 2 Channel 1	2	D3008		
LB3106 Card 2 Channel 2	2	D3009		
LB3106 Card 2 Channel 3	2	D3010		
LB3106 Card 2 Channel 4	2	D3011		
LB3106 Card 3 Channel 1	2	D3012		
LB3106 Card 3 Channel 2	2	D3013		
LB3106 Card 3 Channel 3	2	D3014		
LB3106 Card 3 Channel 4	2	D3015		
LB3102+4HART	18	D3016-D3024		
LB3102+4HART	18	D3025-D3033		
LB4106	2	D3034	8	3101-3104
LB4106	2	D3035	8	3105-3108

3.3.2.5 Function Blocks Programming

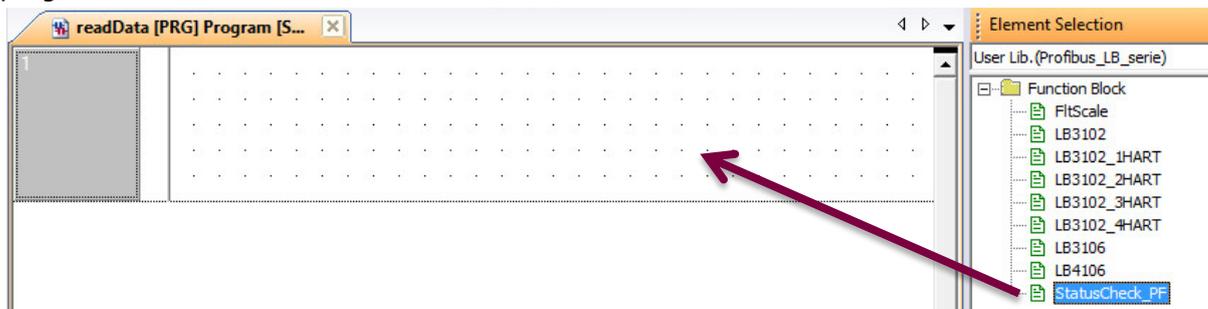
3.3.2.5.1 Function Block StatusCheck_PF

The function block "StatusCheck_PF" gives the status of the LB8109 Com Unit.

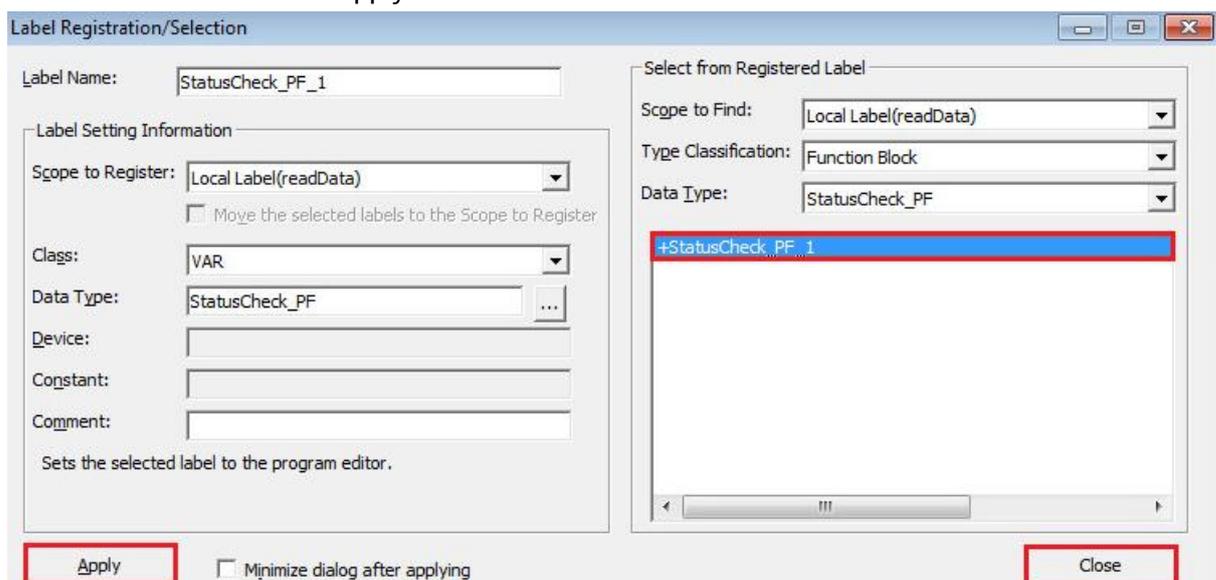
- Double-click on "Program" in the menu "POU → Program → readData". This opens the program page.



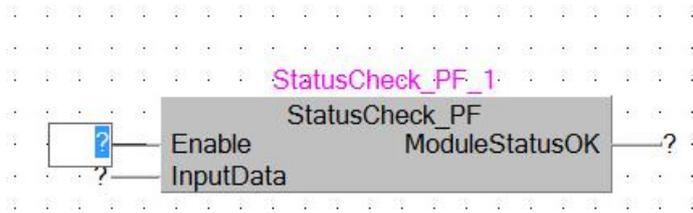
- Drag and drop the function block "StatusCheck_PF" from the "Profibus_LB_serie" library to the program window.



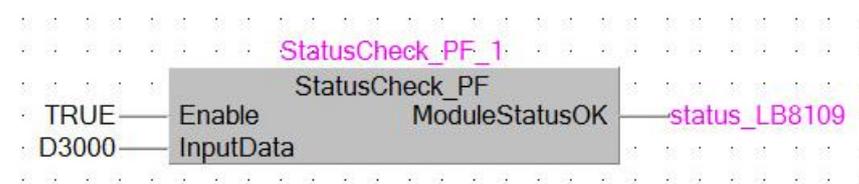
- Following window is automatically opened. Select the local variable "StatusCheck_PF" (Label Name,) which was declared previously in chapter 0 and click on the button "Apply" then on the button "Close".



- The label of the function block has been updated.



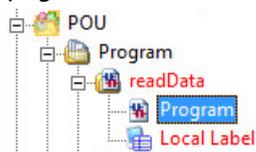
- Assign all relevant variables.



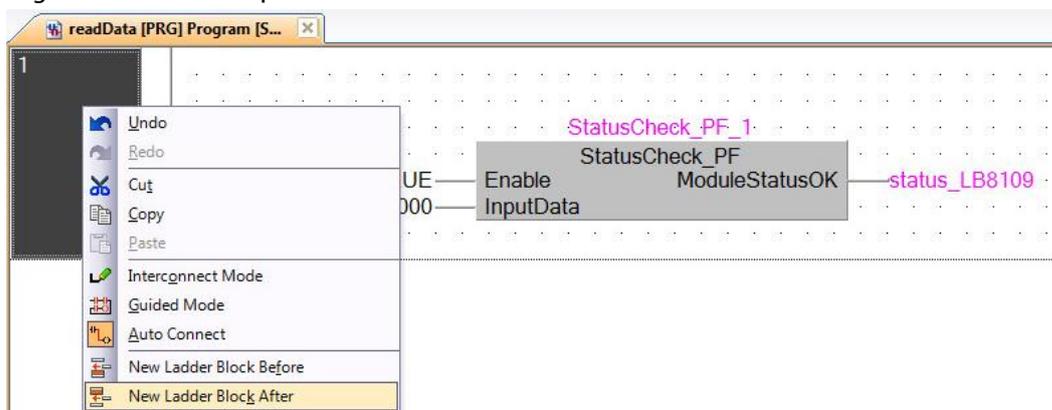
The output variable, "status_LB8109" in this example, is set to "TRUE" if LB8109 Com Unit status equals 0x80.

3.3.2.5.2 Function Block LB3106

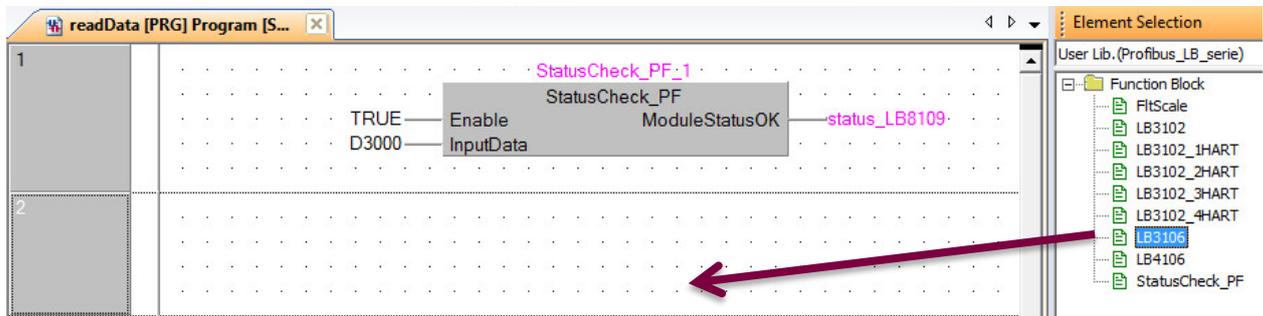
- Double-click on "Program" in the menu "POU → Program → readData". This opens the program page.



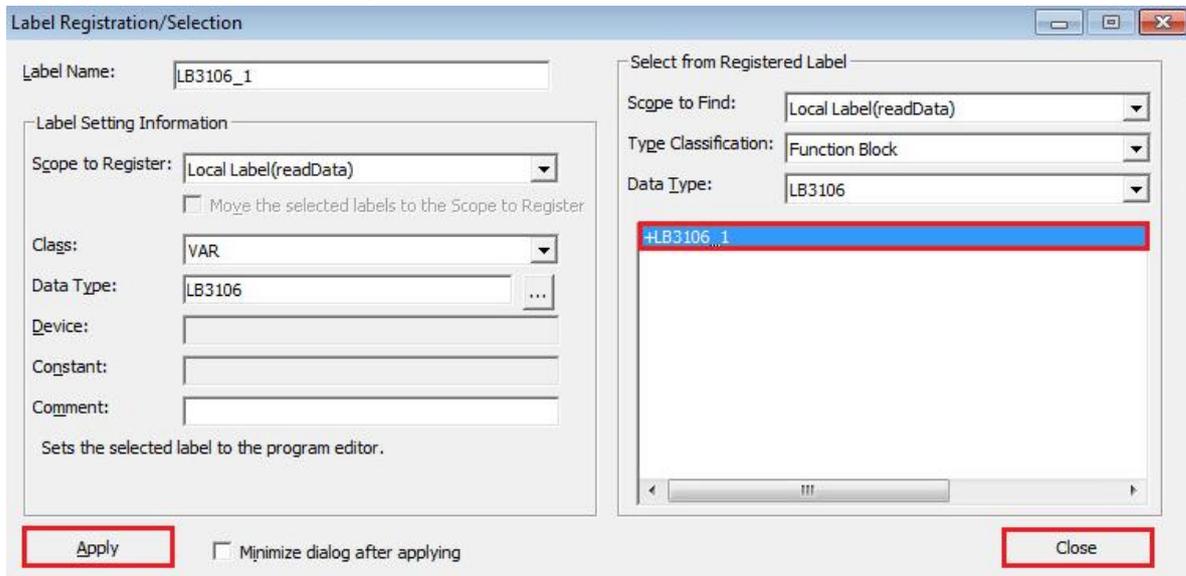
- Right-click on the top-left corner and select the menu "New Ladder Block After".



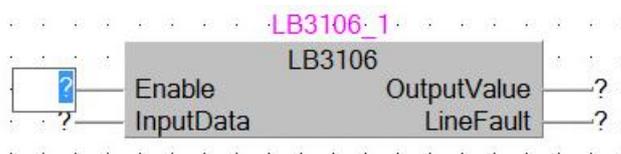
- Drag and drop the function block “LB3106” from the “Profibus_LB_serie” library to the program window.



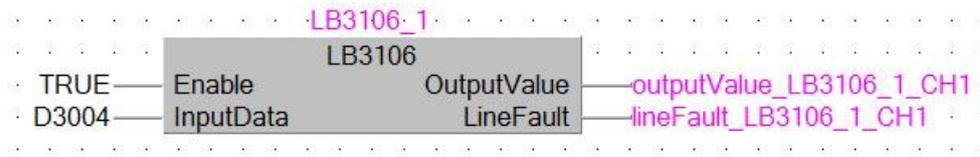
- Following window is automatically opened.
 Select the local variable “LB3106_1” (Label Name,) which was declared previously in chapter 0 and click on the button “Apply” then on the button “Close”.



- The label of the function block has been updated.



- Assign all relevant variables.



The output variable "outputValue_LB3106_1_CH1" corresponds to the 4/20mA output current of the device. The variable "lineFault_LB3106_1_CH1" indicates, if set to "TRUE", that there is a line break between the device and the card.

- The scaling in the function block "LB3106" must correspond to this example done in the LB3106 card.

- The function block "LB3106" is only designed with these parameters:
 - Lower limit : 0mA / 0 points
 - Begin of range: 4mA / 10000 points
 - End of range: 20mA / 50000 points
 - High limit: 24mA / 60000 points

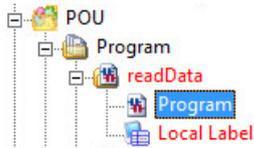
3.3.2.5.3 Function Block LB3102

Five different LB3102 configurations exist. Each configuration type has its own function block.

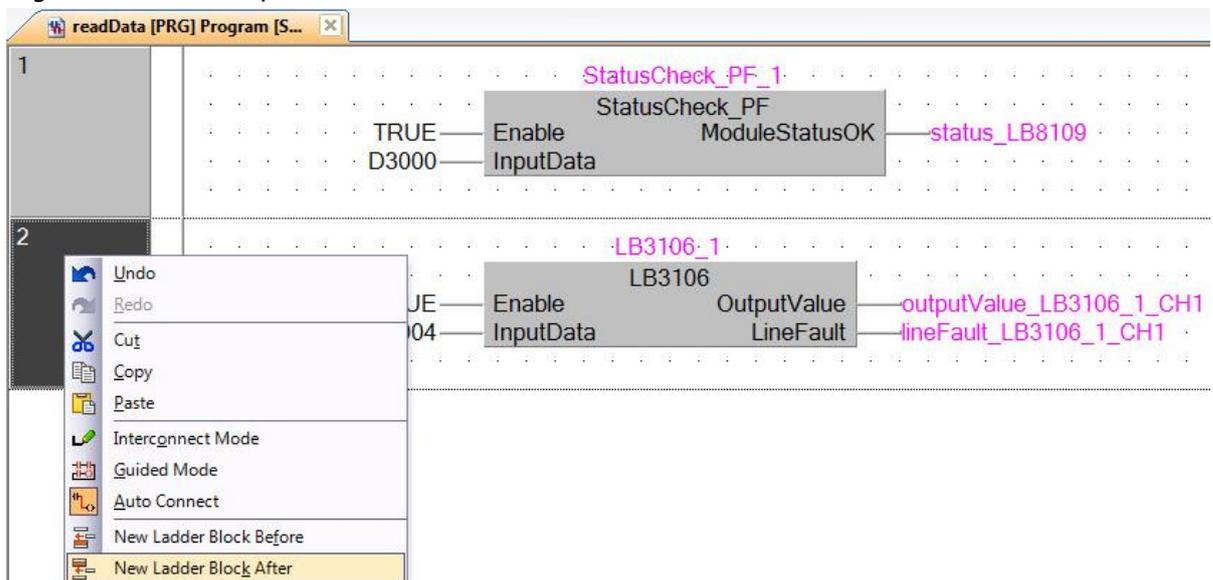
Card Config.	4/20mA	HART Values			
	Output Current	Process Value (PV)	Secondary Value (SV)	Tertiary Value (TV)	Quaternary Value (QV)
LB3102/3	✓	✗	✗	✗	✗
LB3102+1HART	✓	✓	✗	✗	✗
LB3102+2HART	✓	✓	✓	✗	✗
LB3102+3HART	✓	✓	✓	✓	✗
LB3102+4HART	✓	✓	✓	✓	✓

The following example shows the configuration of the function block "LB3102_4HART" which has the most of parameters (Output current value + 4 HART values).

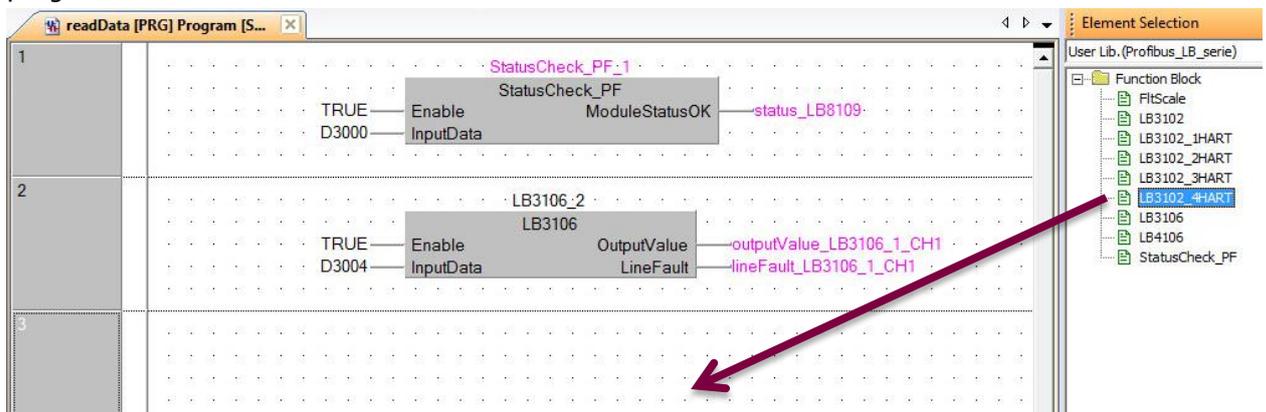
- Double-click on "Program" in the menu "POU → Program → readData". This opens the program page.



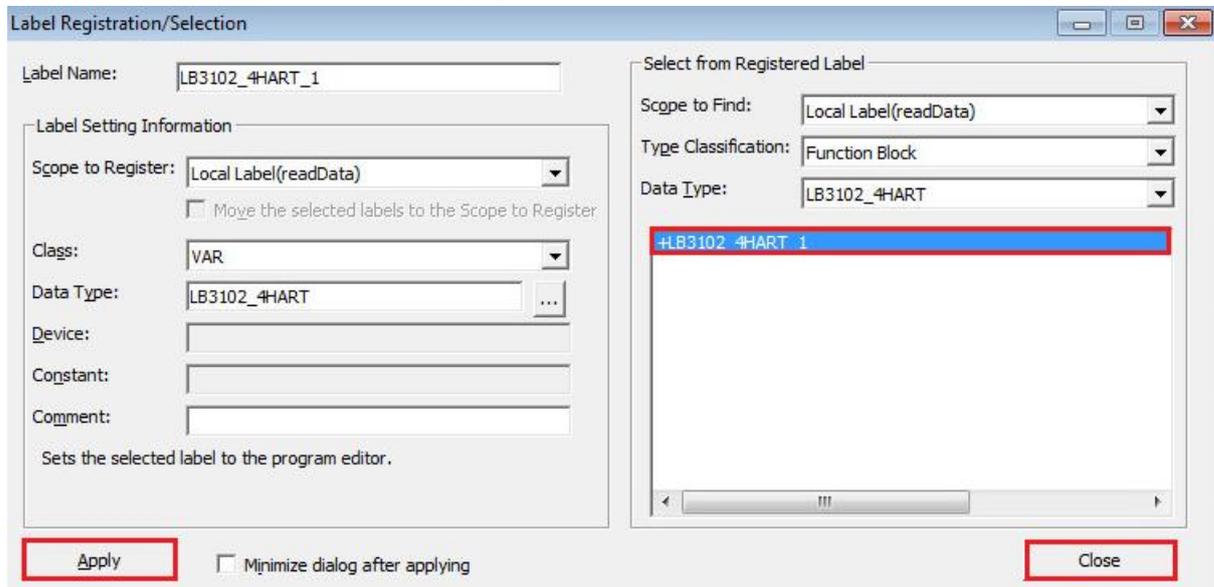
- Right-click on the top-left corner and select the menu "New Ladder Block After".



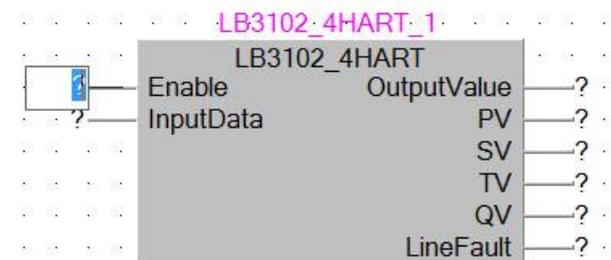
- Drag and drop the function block "LB3102_4HART" from the "Profibus_LB_serie" library to the program window.



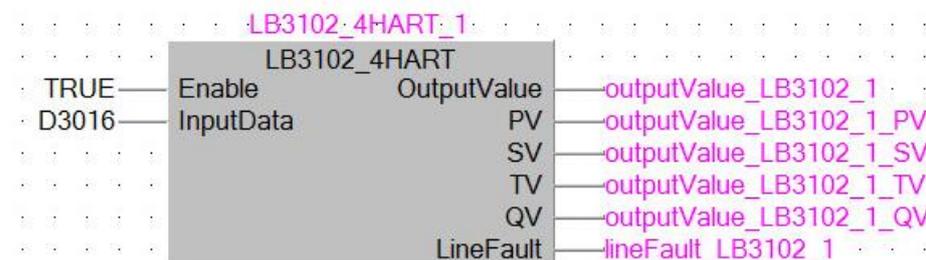
- Following window is automatically opened.
 Select the local variable "LB3102_4HART_1" (Label Name,) which was declared previously in chapter 0 and click on the button "Apply" then on the button "Close".



- The label of the function block has been updated.

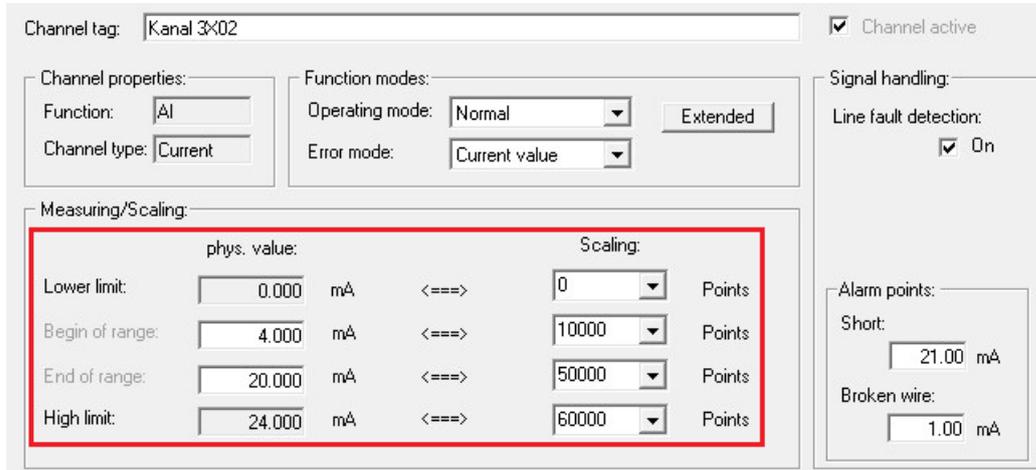


- Assign all relevant variables.



The output variable "outputValue_LB3102_1" corresponds to the 4/20mA output current of the device. The variables "outputValue_LB3102_1_PV", "outputValue_LB3102_1_SV", "outputValue_LB3102_1_TV" and "outputValue_LB3102_1_QV" correspond to the HART data. The variable "lineFault_LB3102_1" indicates, if set to "TRUE", that there is a line break between the device and the card.

- The scaling in the function block “LB3102_4HART_1” must correspond to this example done in the LB3102 card.



Channel tag: Kanal 3x02 Channel active

Channel properties:
 Function: AI
 Channel type: Current

Function modes:
 Operating mode: Normal
 Error mode: Current value

Signal handling:
 Line fault detection: On

Measuring/Scaling:

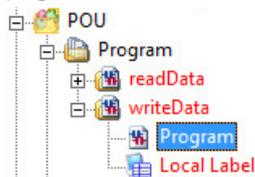
	phys. value:			Scaling:	
Lower limit:	0.000	mA	<===>	0	Points
Begin of range:	4.000	mA	<===>	10000	Points
End of range:	20.000	mA	<===>	50000	Points
High limit:	24.000	mA	<===>	60000	Points

Alarm points:
 Short: 21.00 mA
 Broken wire: 1.00 mA

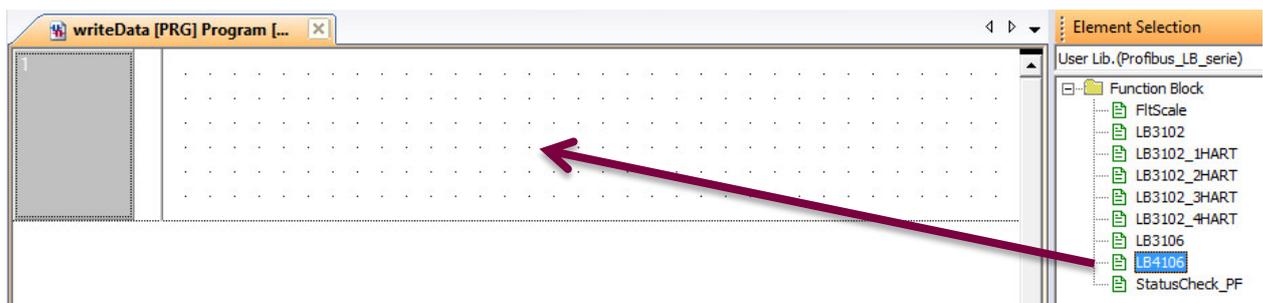
- All function blocks for “LB3102” are only designed with these parameters:
 - Lower limit : 0mA / 0 points
 - Begin of range: 4mA / 10000 points
 - End of range: 20mA / 50000 points
 - High limit: 24mA / 60000 points

3.3.2.5.4 Function Block LB4106

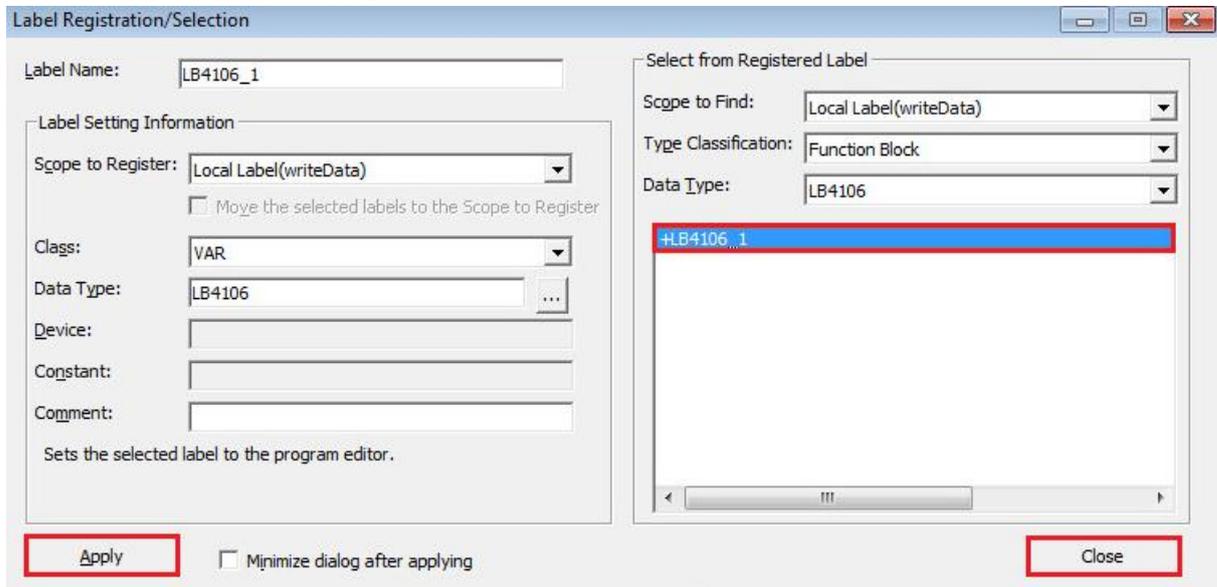
- Double-click on “Program” in the menu “POU → Program → writeData”. This opens the program page.



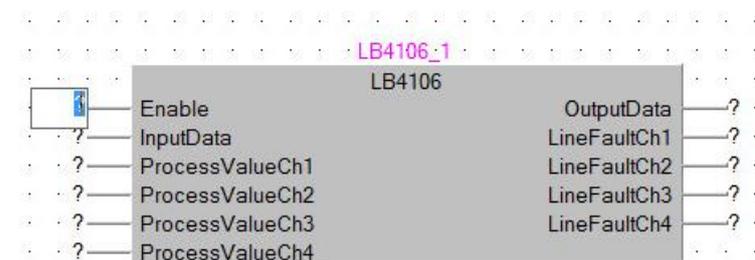
- Drag and drop the function block “LB4106” from the “Profibus_LB_serie” library to the program window.



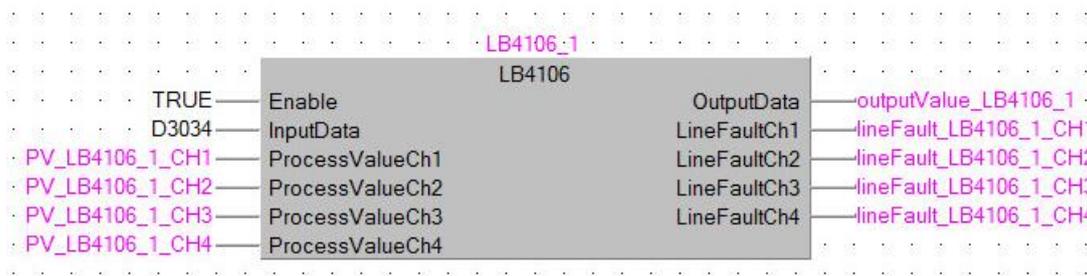
- Following window is automatically opened.
 Select the local variable "LB4106_1" (Label Name,) which was declared previously in chapter 0 and click on the button "Apply" then on the button "Close".



- The label of the function block has been updated.

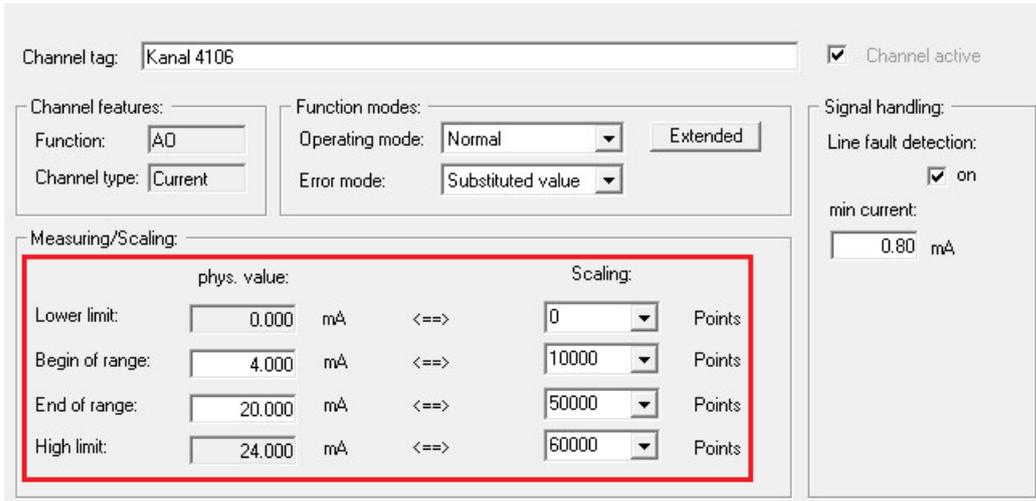


- Assign all relevant variables.



Variables "PV_LB4106_1CHx" correspond to the set point values (0 to 100%). The output variable "outputValue_LB4106_1" is a table containing the scaled set points values for all channels. The variable "lineFault_LB4106_1_CHx" indicates, if set to "TRUE", that there is a line break between the actuator and the card.

- The scaling in the function block "LB4106" must correspond to this example done in the L4106 card.



	phys. value:		Scaling:	
Lower limit:	0.000 mA	<==>	0	Points
Begin of range:	4.000 mA	<==>	10000	Points
End of range:	20.000 mA	<==>	50000	Points
High limit:	24.000 mA	<==>	60000	Points

- The function block "LB3106" is only designed with these parameters:
 - Lower limit : 0mA / 0 points
 - Begin of range: 4mA / 10000 points
 - End of range: 20mA / 50000 points
 - High limit: 24mA / 60000 points

3.4 Commissioning of the Control Project

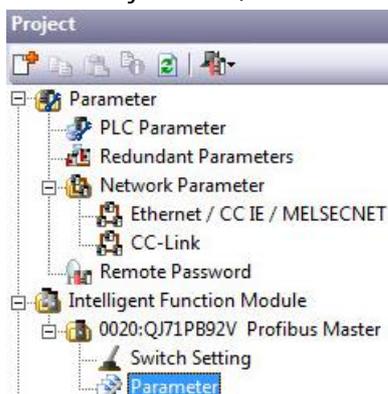
This part describes the POU generation, the program compilation and download.

3.4.1 POU Generation

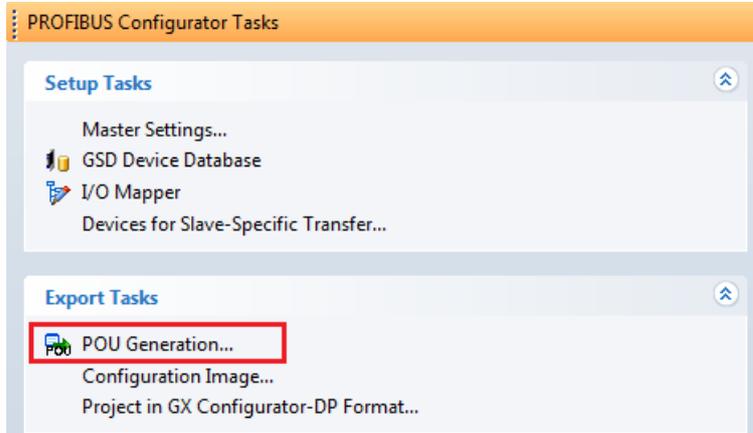
3.4.1.1 POU Generation steps

This part must be executed as soon as any changes have been done in the Field Network configuration.

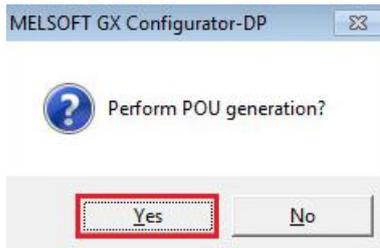
- In the Project view, double-click on the PROFIBUS module menu "0020:QJ71PB92V→Parameter".



- The tab 0020:QJ71PB92V is opened.
- Select the menu “PROFIBUS Configurator Tasks →Export Tasks→POU Generation”.

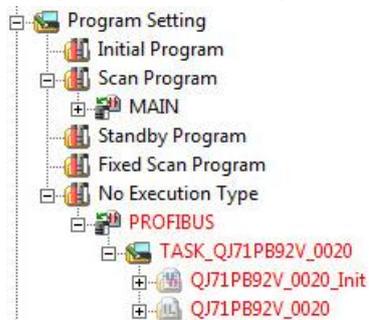


- The following window is displayed. Click on the button “Yes” to execute the task. There is no message when the task is finished. The previous window is just closed.

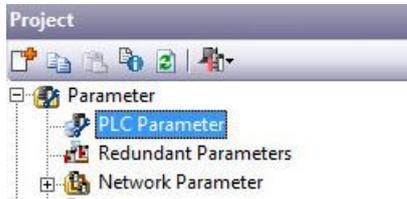


3.4.1.2 POU generated PROFIBUS task

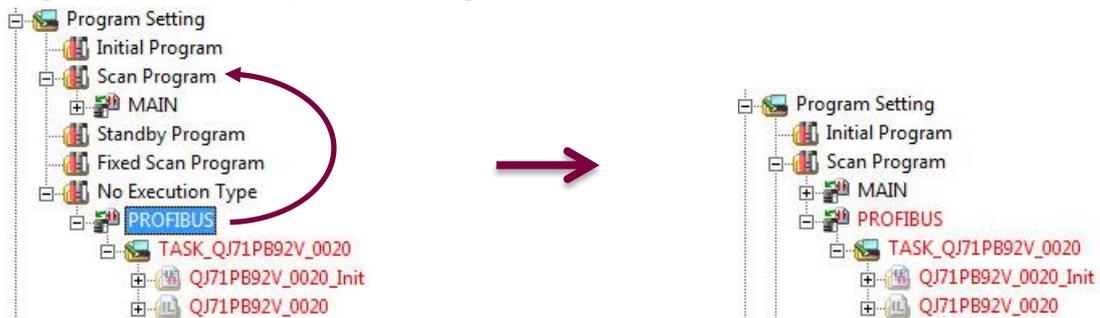
- During the first POU generation, the PROFIBUS tasks of the library “QJ71PB92V_0020” are assigned automatically in the field “No Execution Type”.



- In the project view, double-click on the menu “Parameter →PLC Parameter”.

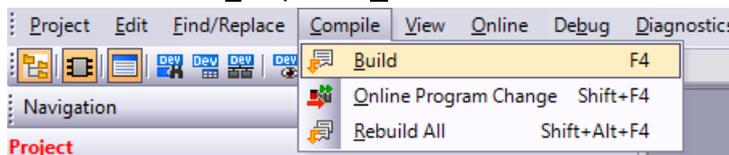


- In the menu “Program Setting”, select the data “PROFIBUS” in the part “No Execution Type”, then drag and drop it in the part “Scan Program”.

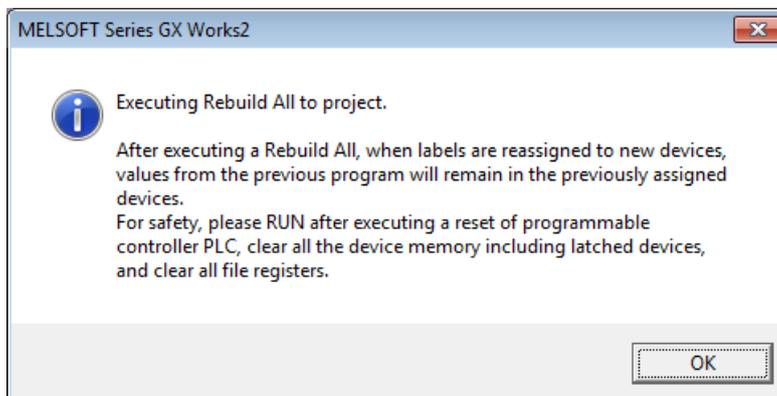


3.4.2 Program Compilation

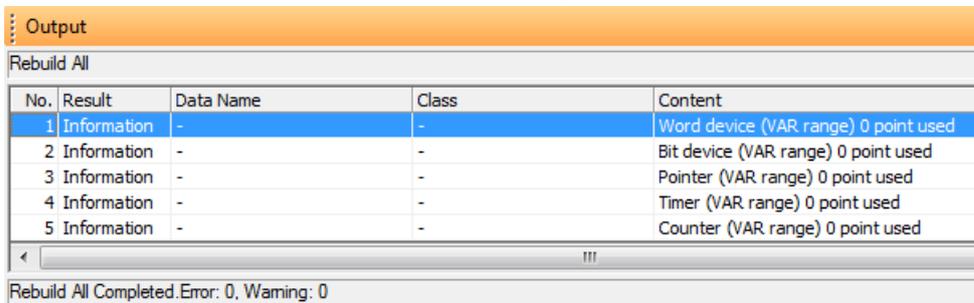
- Select the menu “Compile → Build”.



- A “Rebuild All” can be requested to convert and compile all data (programs, structured data, labels, functions, function blocks)
- Click on the button “OK” to continue.



- The compilation results are displayed in the window "Output".
In this case, there are 0 Errors and 0 Warnings.



No.	Result	Data Name	Class	Content
1	Information	-	-	Word device (VAR range) 0 point used
2	Information	-	-	Bit device (VAR range) 0 point used
3	Information	-	-	Pointer (VAR range) 0 point used
4	Information	-	-	Timer (VAR range) 0 point used
5	Information	-	-	Counter (VAR range) 0 point used

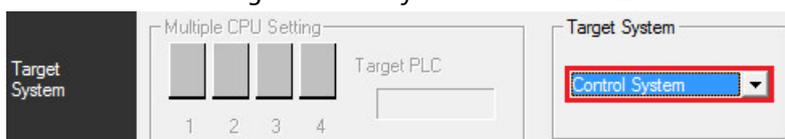
Rebuild All Completed. Error: 0, Warning: 0

3.4.3 Program Download

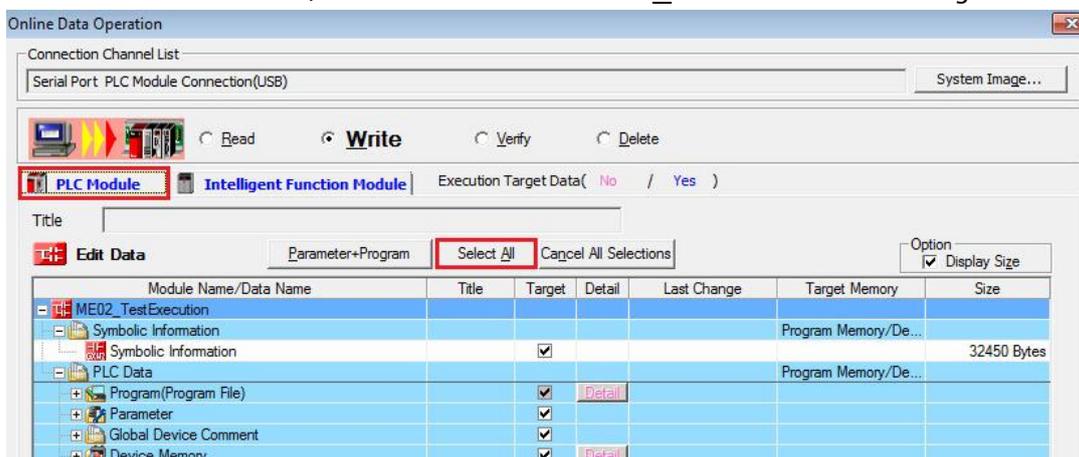
3.4.3.1 First Download

The first download needs to be done on each PLC separately by using the USB port. Configuration of the Connection Destination has been done in chapter 3.1.4.1. **Both PLCs are stopped and the tracking cable is removed.**

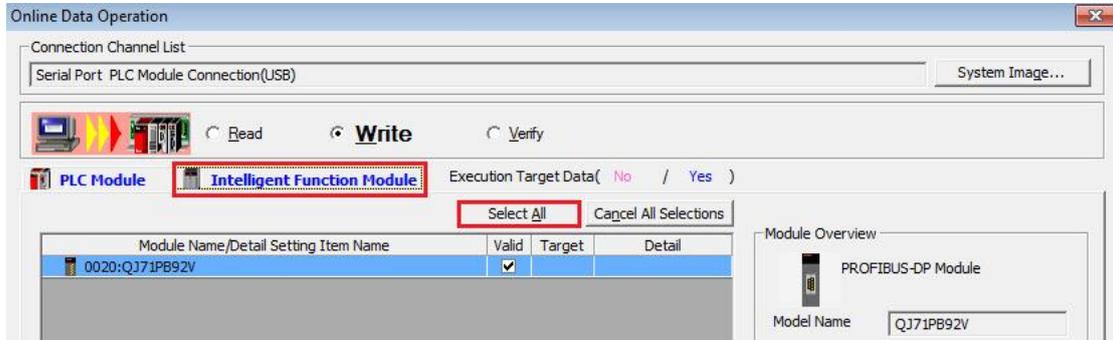
- Connect the USB cable from the PLC A port to the engineering network one.
- Open the menu Connection Destination, right-click on the connection "USB" and select the option "set as Default Connection" default.
- Double-click on the connection "USB" and select the target system "Control System" in order to download the configuration only in the Control PLC.



- In the Tab "PLC Module", click on the button "Select All" to cross check all targets.



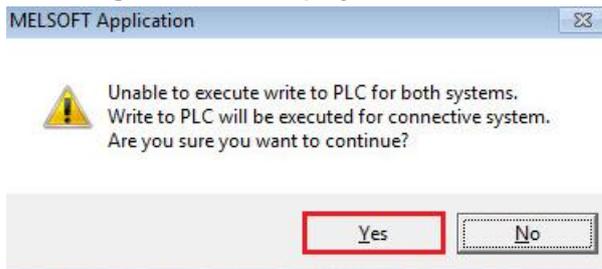
- In the Tab "Intelligent Function Module", click on the button "Select All".



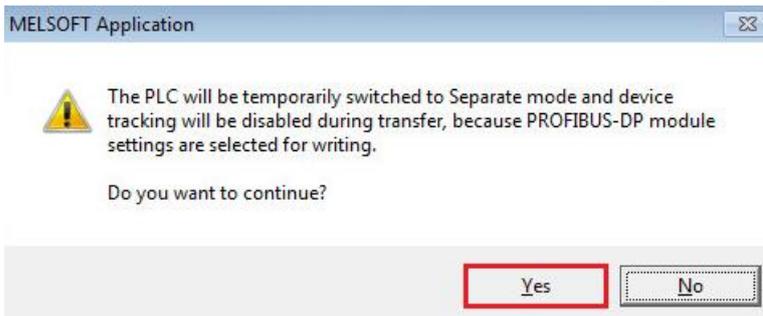
- Click on the button "Execute".



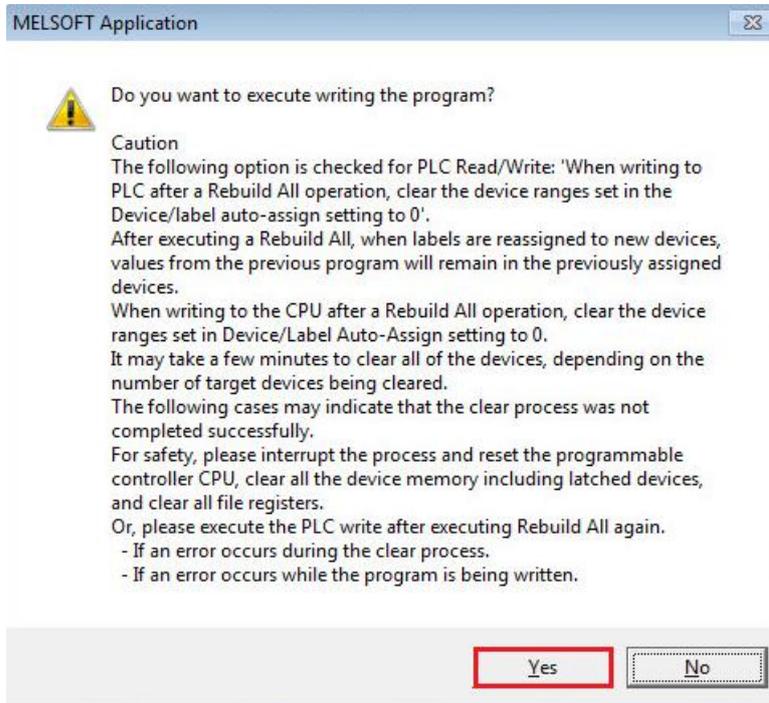
- Following window is displayed. Click on the button "Yes".



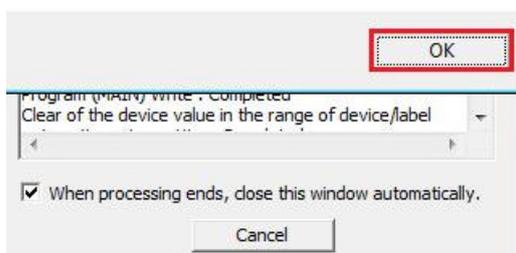
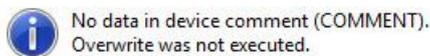
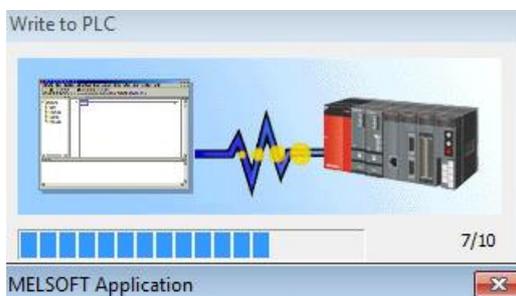
- Following window is displayed. Click on the button "Yes".



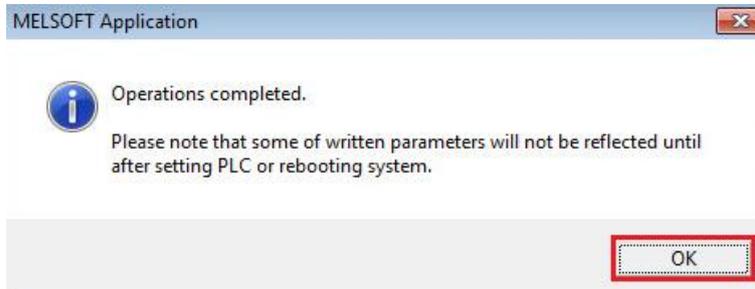
- Following window is displayed. Click on the button “Yes”.



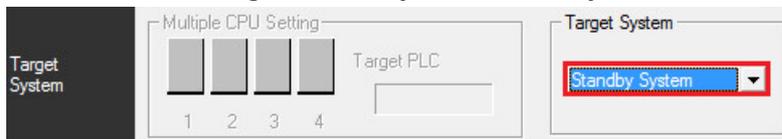
- Download is started. Click on the button “OK”



- Following window is displayed, click on the button “OK”.



- Connect the USB cable to the second PLC
- Double-click on the connection “USB” and select the target system “Standby System” in order to download the configuration only in the Standby PLC.

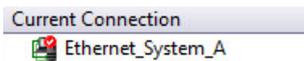


- Repeat the previous steps of this chapter to download the configuration in the second PLC.
- Reboot both PLCs simultaneously.

3.4.3.2 Other Downloads

The tracking cable is connected in order to download the configuration in both PLCs.

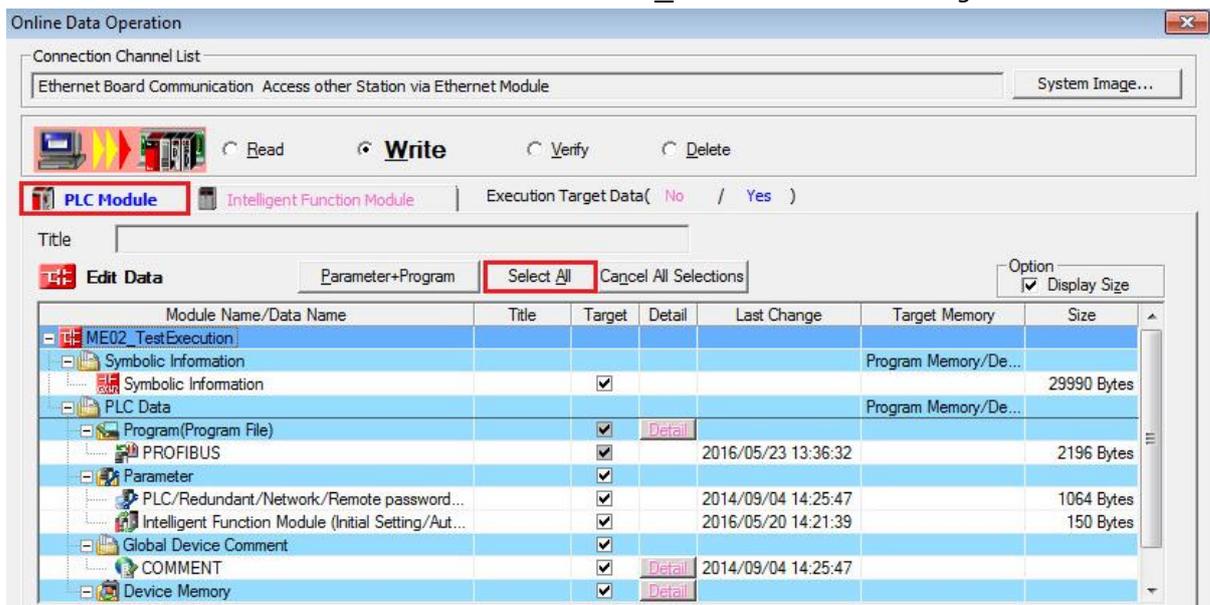
- Select the “Destination Connection” of the PLC which has the Control. In this example, it is the Connection Destination “Ethernet_System_A”.



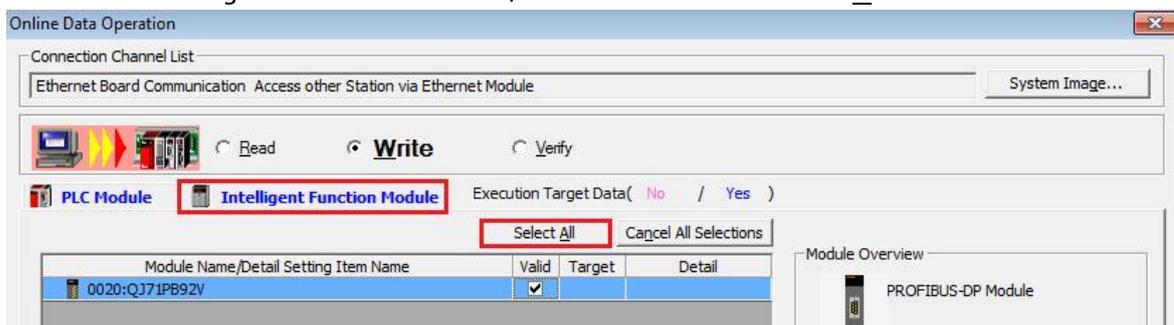
- Select the menu “Online → Write to PLC”.



- In the Tab “PLC Module”, click on the button “Select All” to cross check all targets.



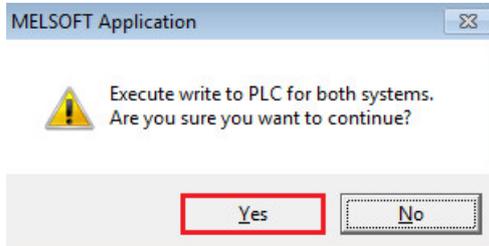
- In the Tab “Intelligent Function Module”, click on the button “Select All”.



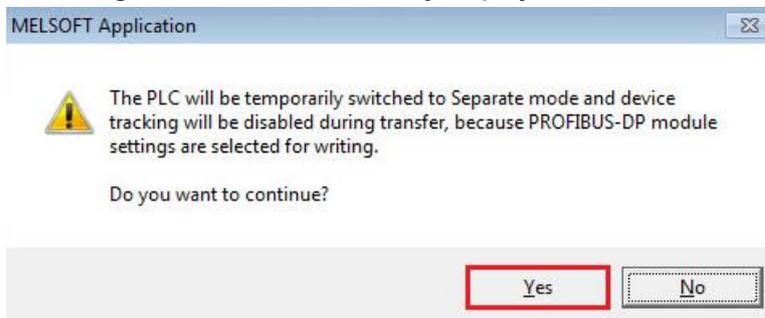
- Click on the button "Execute".



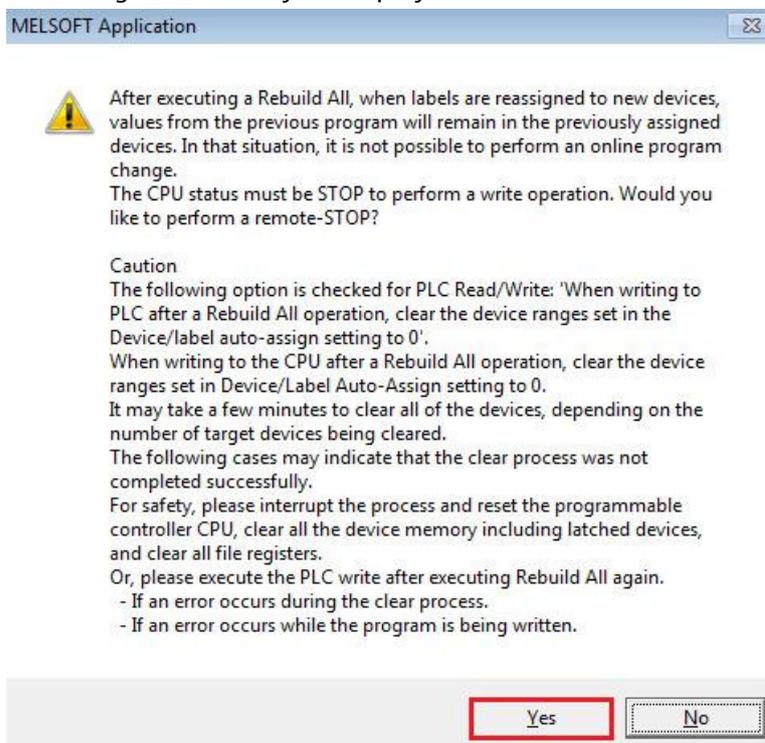
- Following window is automatically displayed. Click on the button "Yes" to proceed.



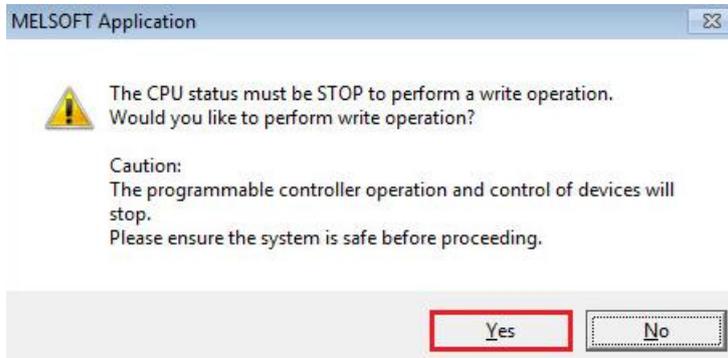
- Following window is automatically displayed. Click on the button "Yes" to proceed.



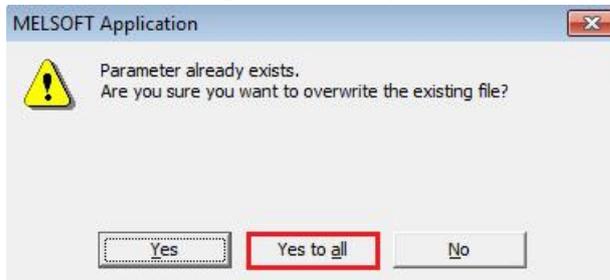
- Following window may be displayed. Click on the button "OK".



- Following window may be displayed. Click on the button “OK”.



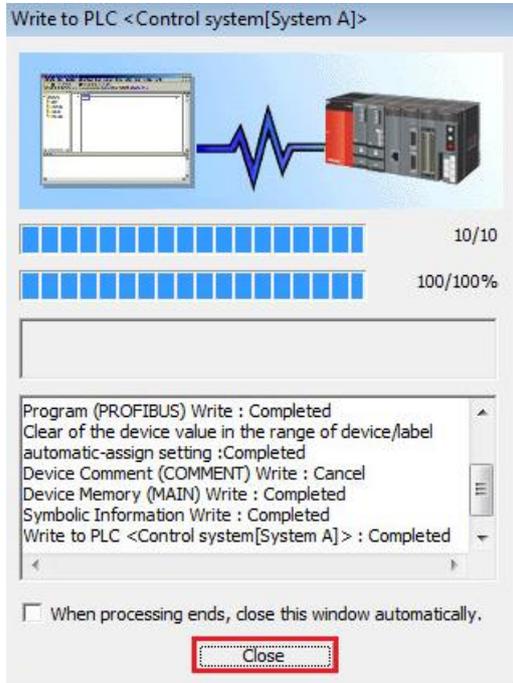
- The download to the PLC with the Control is started. In this example, the System A has the Control. Following window may be displayed. Click on the button “Yes to All”.



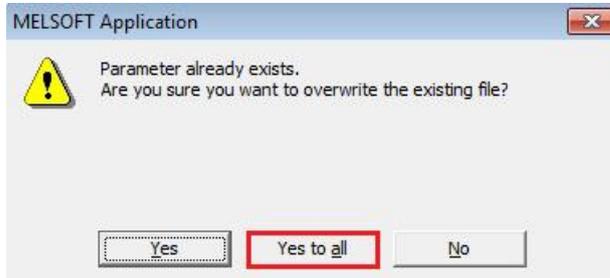
- Following window is displayed. Click on the button “OK”.



- When the download to the system is finished, click on the button "Close" to start the download to System B.



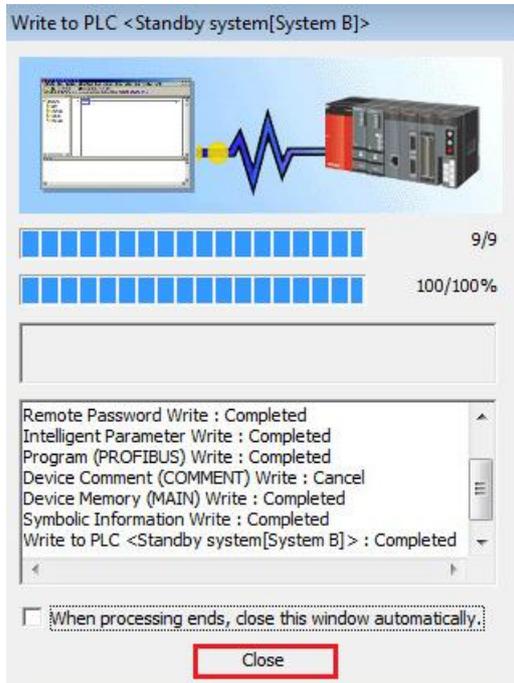
- As for the first system, click on the button "Yes to all".



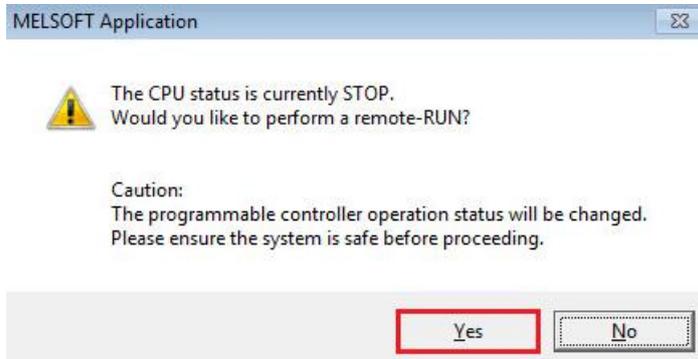
- As for the first system, following window is displayed. Click on the button "OK".



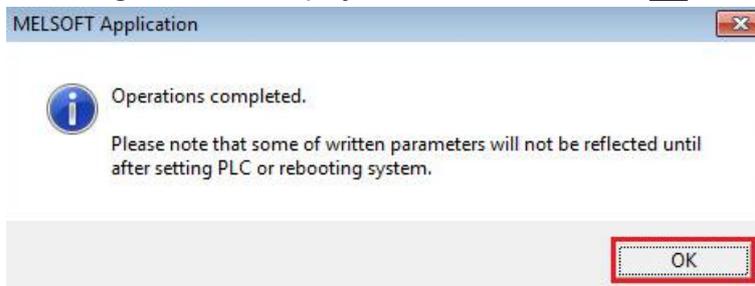
- When the download to the system is finished, click on the button "Close".



- Following window is displayed, click on the button "Yes" to run the PLC.

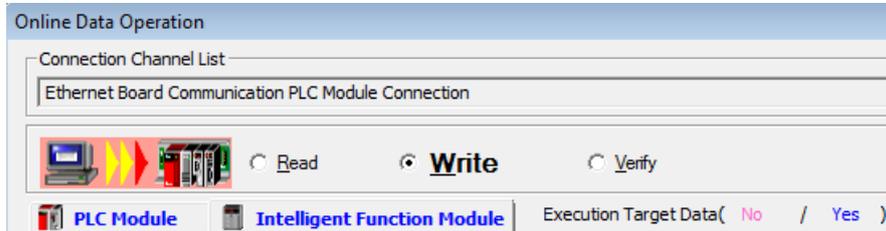


- Following window is displayed, click on the button "OK".

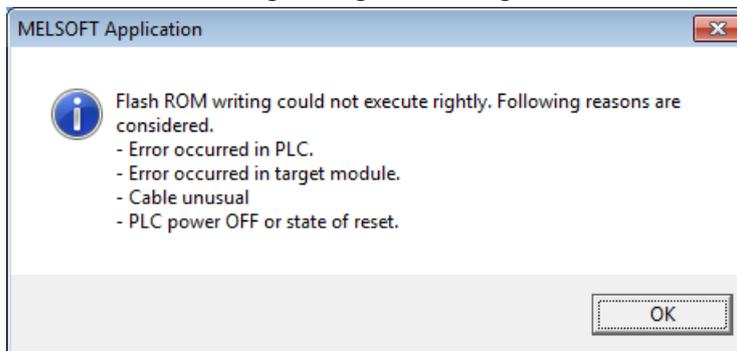


Notes:

- It is possible to download separately the part "PLC Module" and "Intelligent Function Module".



- If an error is occurring during the writing as described on the following window:



1. Download only the part "PLC module".
2. Reset the PLC.
3. Download only the part "Intelligent Function Module".

3.5 Monitoring of Process Values and Status Information

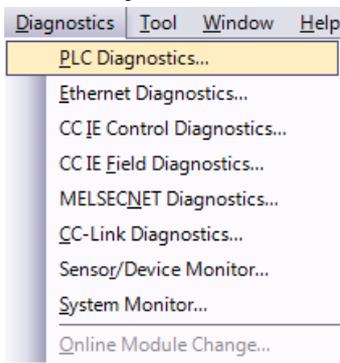
This part describes some tools, which are useful once the PLC is in Run operating mode for checking hardware status or online variables values.

3.5.1 Diagnostics

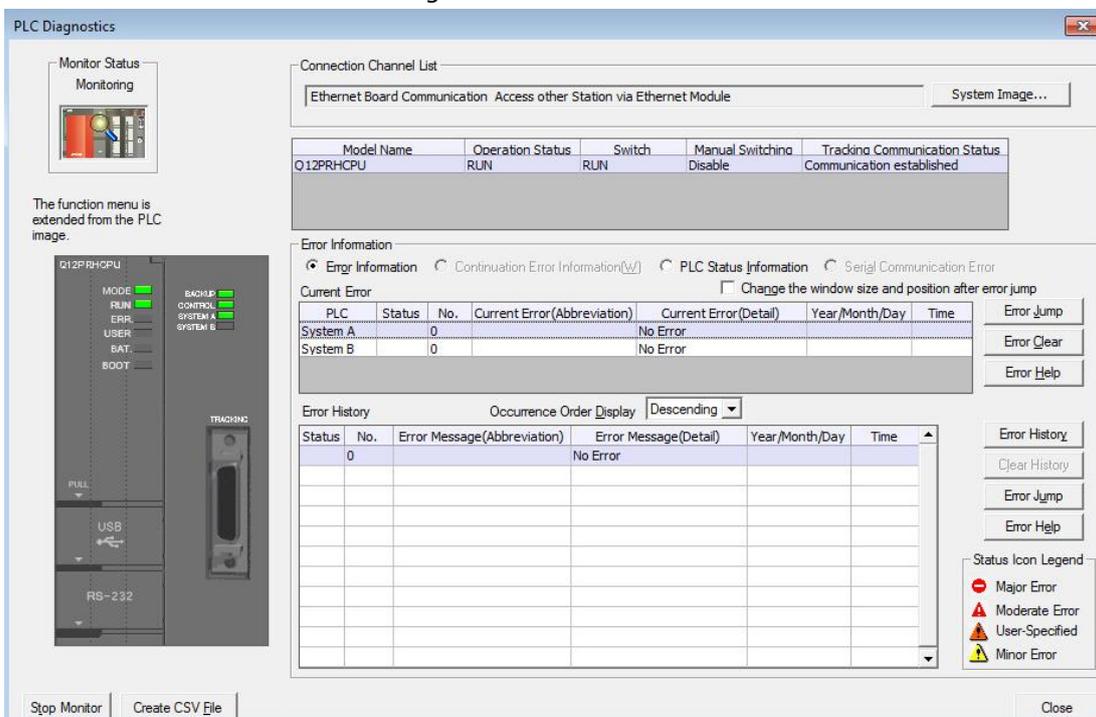
3.5.1.1 PLC Diagnostics

The diagnostic function "PLC Diagnostics" displays the PLC status/errors.

- In the Project view, select the menu "Diagnostics → PLC Diagnostics".



- No errors detected in the following window:



The function menu is extended from the PLC image.

Model Name	Operation Status	Switch	Manual Switching	Tracking Communication Status
Q12PRHCPU	RUN	RUN	Disable	Communication established

PLC	Status	No.	Current Error(Abbreviation)	Current Error(Detail)	Year/Month/Day	Time
System A	0		No Error			
System B	0		No Error			

Status	No.	Error Message(Abbreviation)	Error Message(Detail)	Year/Month/Day	Time
0		No Error			

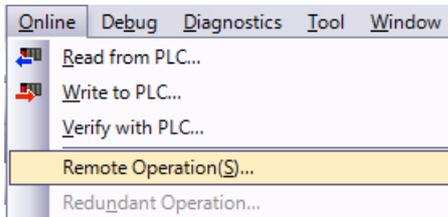
Status Icon Legend

- Major Error
- Moderate Error
- User-Specified
- Minor Error

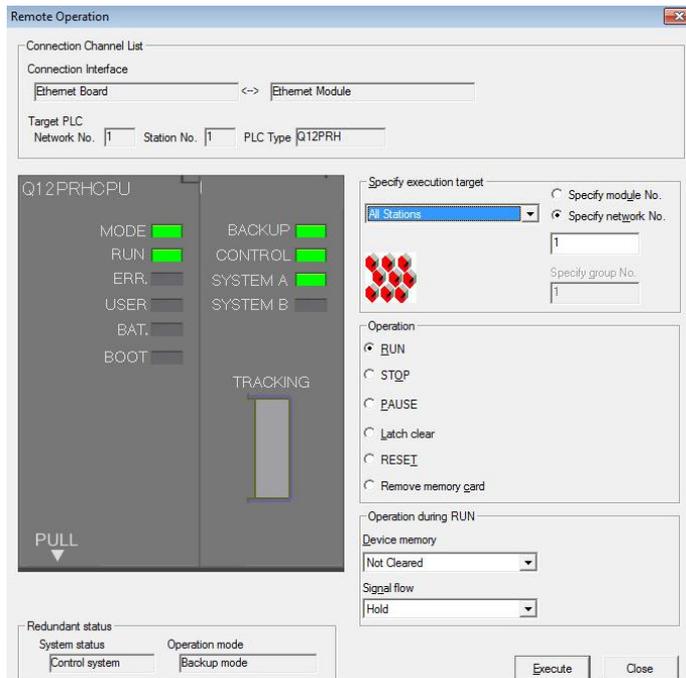
3.5.1.1.1 PLC Remote Operation

The "PLC Remote Operation" window allows the operator to change the PLC operation mode.

- Select the menu "Online → Remote Operation(S)".



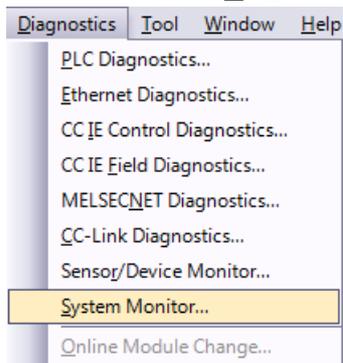
- The "Remote Operation" window is displayed.
 - Select the requested Operation mode and click on the button "Execute".
 - Click on the button "Close" to close the window.



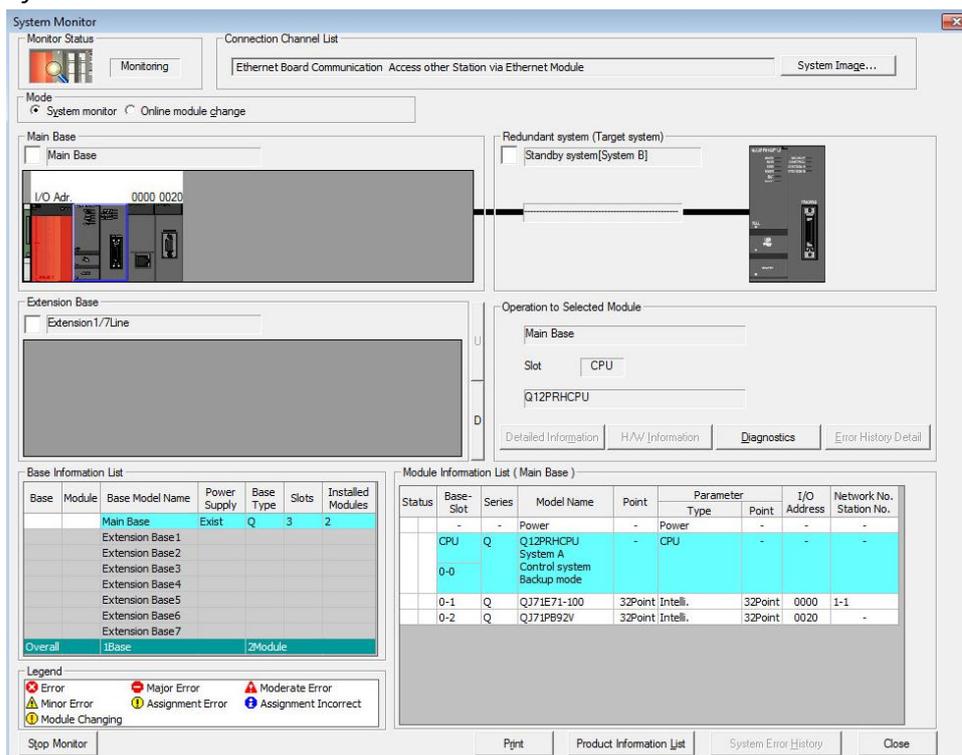
3.5.1.1.2 PLC System Monitor

The diagnostic function "System Monitor" show the status of all hardware parts of the Mitsubishi Electric PLC environment.

- Select the menu "Diagnostics → System Monitor".



- System Monitor of the hardware environment.



The System Monitor interface displays the following components:

- Monitor Status:** Monitoring mode selected. Connection Channel List: Ethernet Board Communication. Access other Station via Ethernet Module. System Image... button.
- Mode:** System monitor (selected), Online module change.
- Main Base:** I/O Adr. 0000 0020. Visual representation of the PLC rack.
- Redundant system (Target system):** Standby system[System B].
- Operation to Selected Module:** Main Base, Slot CPU, Q12PRHCPU. Buttons: Detailed Information, H/W Information, Diagnostics, Error History Detail.
- Extension Base:** Extension 1/7Line.
- Base Information List:**

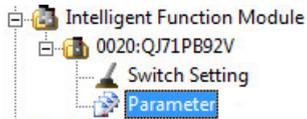
Base	Module	Base Model Name	Power Supply	Base Type	Slots	Installed Modules
		Main Base	Exist	Q	3	2
		Extension Base1				
		Extension Base2				
		Extension Base3				
		Extension Base4				
		Extension Base5				
		Extension Base6				
		Extension Base7				
Overall		1Base				2Module
- Module Information List (Main Base):**

Status	Base-Slot	Series	Model Name	Point	Parameter Type	Point	I/O Address	Network No. Station No.
			Power					
		CPU	Q12PRHCPU System A Control system Backup mode		CPU			
	0-0							
	0-1	Q	QJ71E71-100	32Point Intelli.		32Point	0000	1-1
	0-2	Q	QJ71P892V	32Point Intelli.		32Point	0020	
- Legend:**
 - Error (Red X)
 - Minor Error (Yellow Triangle)
 - Module Changing (Yellow Circle)
 - Major Error (Red Circle)
 - Assignment Error (Yellow Circle)
 - Moderate Error (Red Triangle)
 - Assignment Incorrect (Blue Circle)
- Buttons:** Stop Monitor, Print, Product Information List, System Error History, Close.

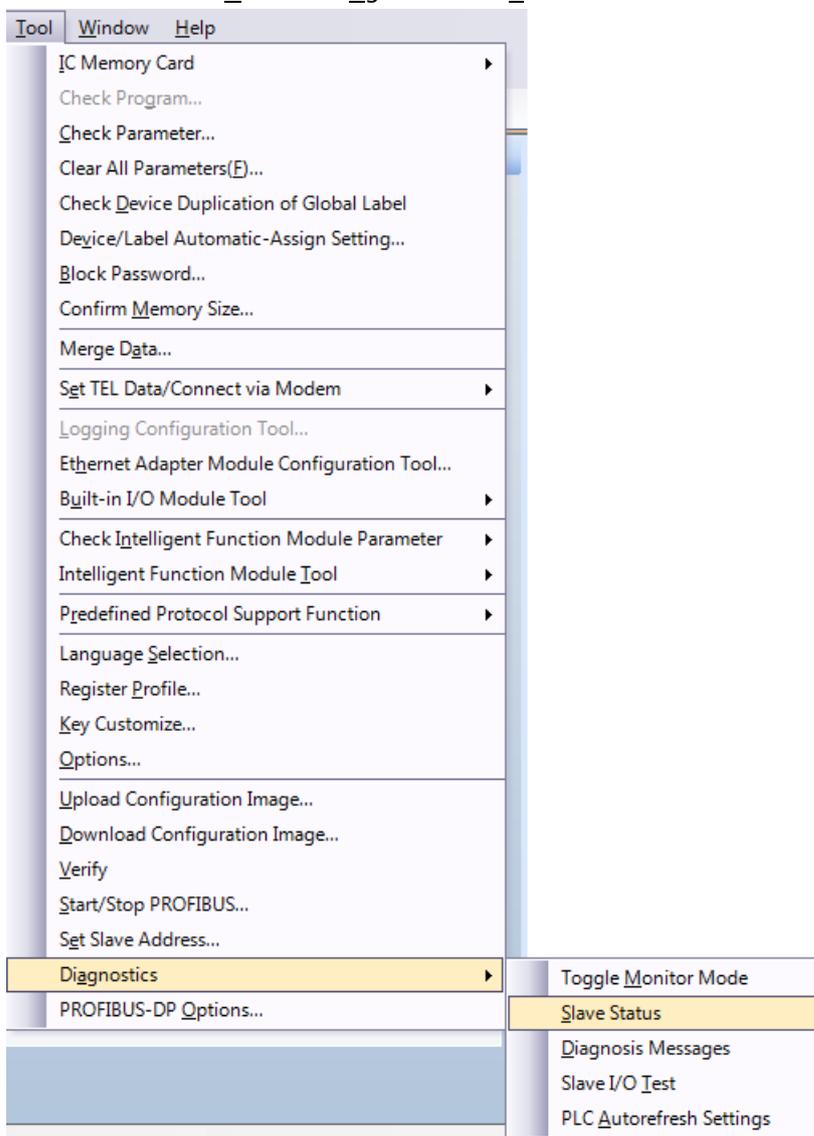
3.5.1.2 PROFIBUS Slave Diagnostics

Some functions are available to check status of PROFIBUS devices.

- Double-click on the menu “0020:QJ71PB92V → Parameter”.



- The Tab “0020:QJ71PB92V” must be opened in order to display the Diagnostics function in tool menu.
- Select the menu “Tool → Diagnostics → Slave Status”.



- The window “Slave Status” is displayed.

In this example, the Pepperl+Fuchs LB81 Com Unit has the PROFIBUS address 61 and is active without any errors (Green colour).

Slave Status

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125				

Slave is inactive Cycle time (in ms)
 Slave has diag. messages Now 6
 Slave has link Min 3
 Slave has no link Max 15

- If some errors are detected, open the menu “Tool → Diagnostics → Diagnosis Messages” to see the corresponding messages.

Diagnostics

- PROFIBUS-DP Options...
- Toggle Monitor Mode
- Slave Status
- Diagnosis Messages**
- Slave I/O Test
- PLC Autorefresh Settings

- In the following example, a device has been disconnected from the card (Slot 9, channel 1). Following messages appear in the PROFIBUS Diagnosis window.

PROFIBUS Diagnosis

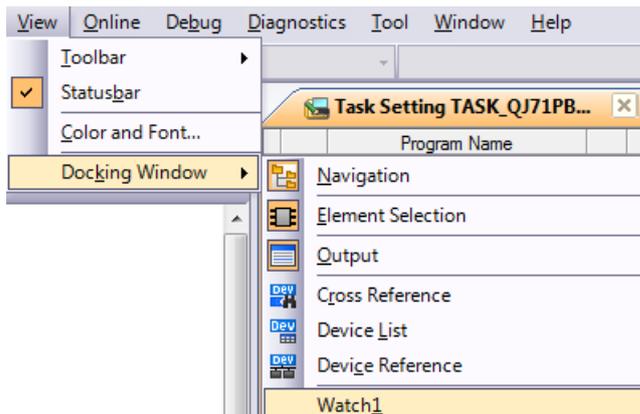
Entry time	Slave name	FDL address	Status	Message
23.05.2016 15:33:48	LB8109_PF	61		Extended diagnostic information exists
23.05.2016 15:33:48	LB8109_PF	61		Modulfehler
23.05.2016 15:33:48	LB8109_PF	61		Buskoppler aktiv
23.05.2016 15:33:48	LB8109_PF	61		Red.kop.: Kein Fehler
23.05.2016 15:33:48	LB8109_PF	61		Slot 9: Falsches Modul
23.05.2016 15:33:48	LB8109_PF	61		Slave module with diag.: 2 (identifiers 2)
23.05.2016 15:33:48	LB8109_PF	61		Channel diag. code: ident.=2/channel=1(1 word input)/type=line break(6)

3.5.2 Online Monitoring

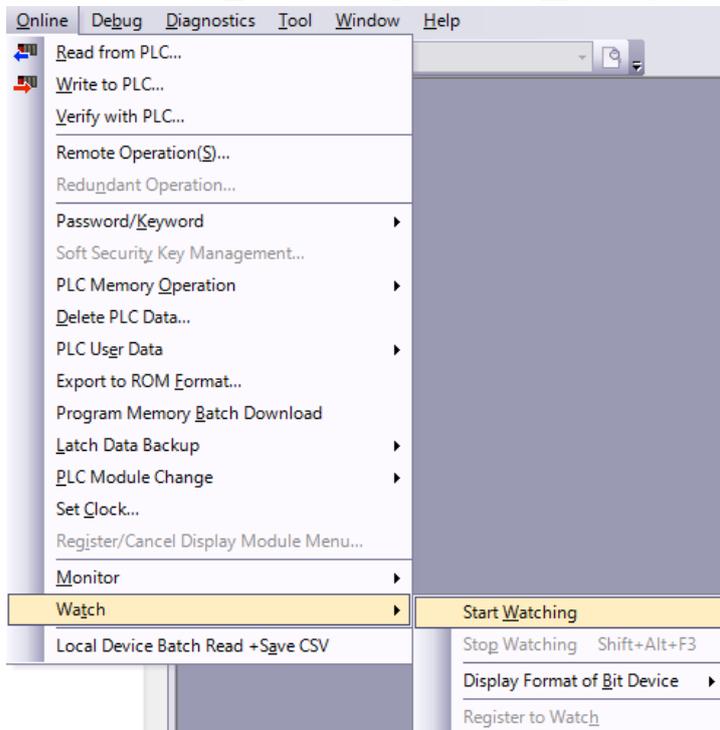
The online monitoring functions as “Watch” or “Monitoring” are used to check variables in online mode.

3.5.2.1 Online Variable Watch Function

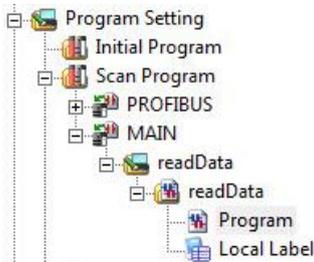
- Select the menu “View → Docking Window → Watch₁” to open the Watch window.



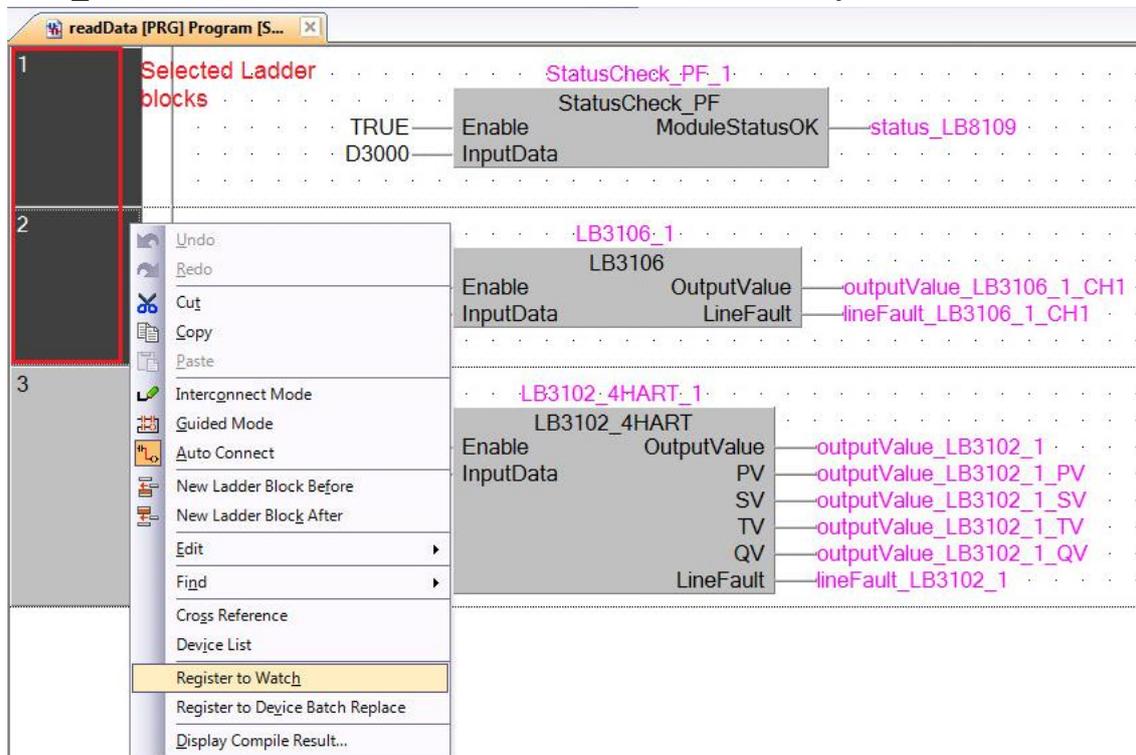
- Select the menu “Online → Watch → Start Watching” to start the function.



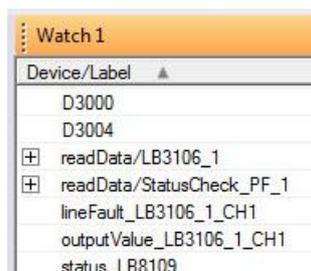
- Add and check the declared variables in the Watch1 window.
- To add a variable in the Watch1 window. Open the page “readData→Program”.



- Right-click in the program page, then select the ladder blocks and click on the menu “Register to Watch”. All variables of the selected ladder blocks are automatically added in the watch window.



- Added variables in the Watch window:

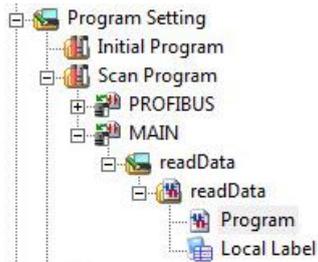


- Select the menu “Online → Watch → Stop Watching” to stop the function.

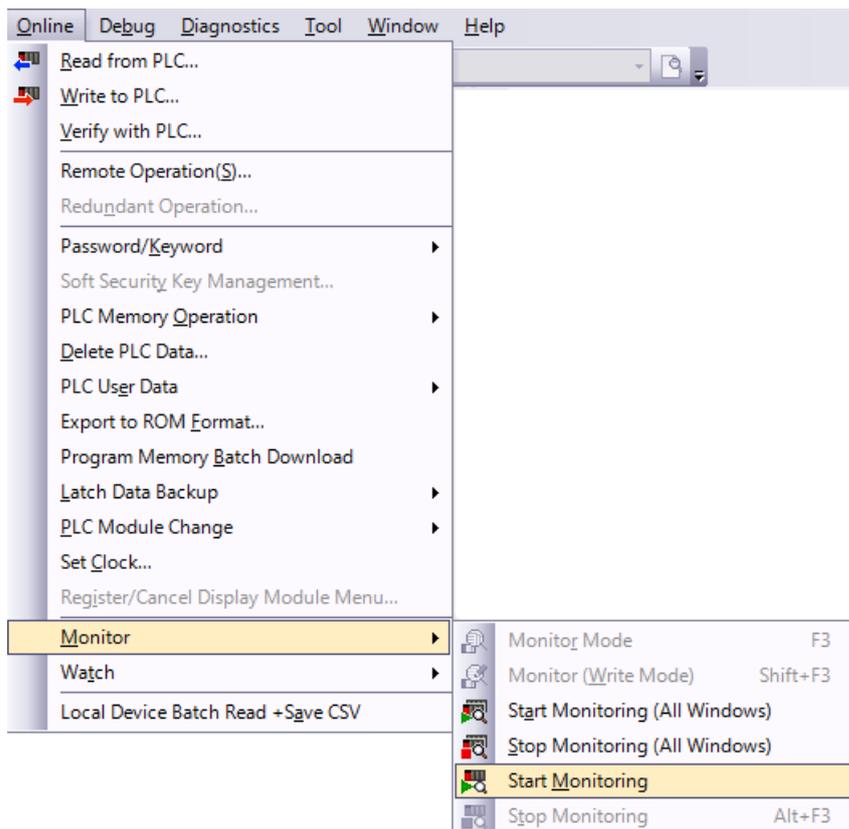
3.5.2.2 Monitoring Function

The function "Monitoring" displays the online values directly on the corresponding function block.

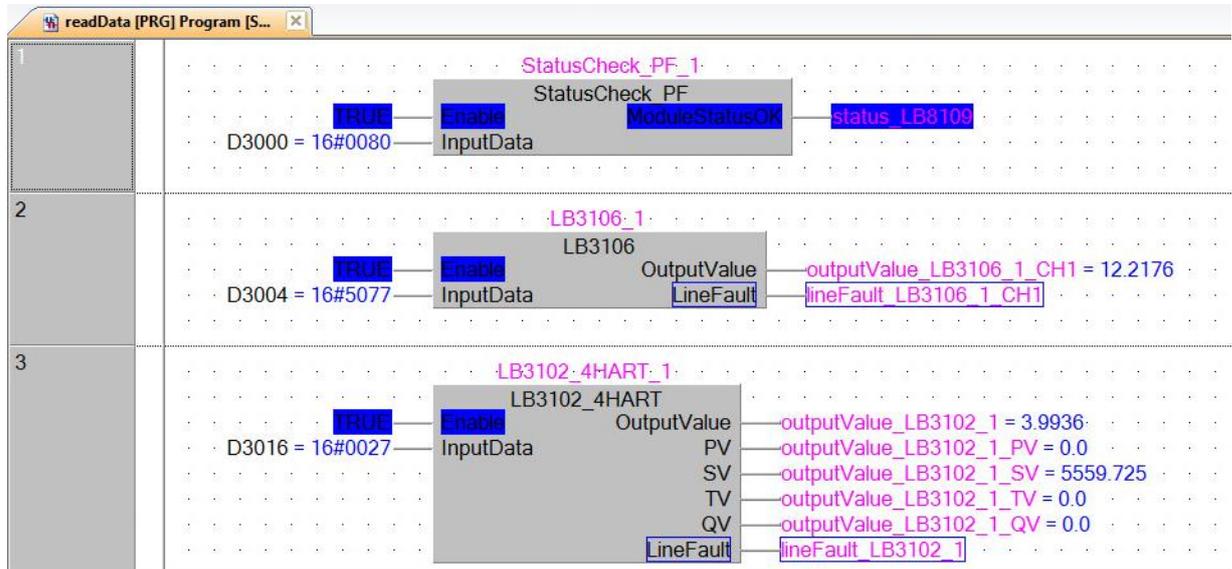
- Select "Program" in the menu "readData → readData". This opens the program page of the function block.



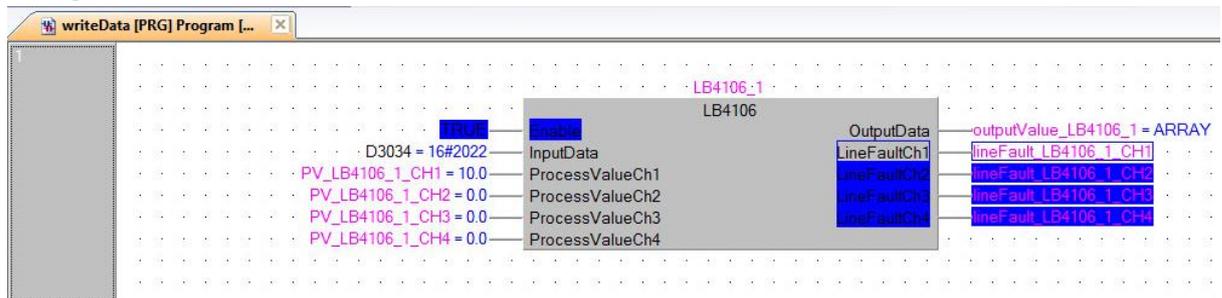
- Select the menu "Online → Monitor → Start Monitoring" to start the function.



- Online monitoring for the configured input function blocks:



- Online monitoring for the configured output function block. In this example, a set point of 10% is configured for the AUMA Actuator on Channel1.



- Select the menu “Online → Monitor → Stop Monitoring” to stop the function.

4 Specific Integration for Data Exchange with HART commands

This chapter explains how to handle HART commands from the control strategy.

HART Commands cannot be sent directly, but by configuring an acyclic DPV1 PROFIBUS communication Class 2 between the Mitsubishi Electric Control System and the Pepperl+Fuchs Remote IO. The HART Commands have to be embedded into PROFIBUS telegrams by using dedicated function blocks and are exchanged during the acyclic part of the PROFIBUS cycle.

To evaluate and document the workflow, we have implemented this by example for HART Command 0 and HART Command 3. Further HART Commands may be implemented based on this concept.

4.1 Acyclic DPV1 PROFIBUS Communication Class 2

4.1.1 Communication Principle

The acyclic communication via PROFIBUS is managed in GX Works by using four specific function blocks contained in the library "Profibus_LB_serie":

- The function block "InitiateClass2" is establishing a line connection with the Remote IO System.
- The function block "WriteClass2" is writing data to the Remote IO System.
- The function block "ReadClass2" is reading data from the Remote IO System.
- The function block "AbortClass2" is disconnecting the line connection with the Remote IO System.

The acyclic DPV1 PROFIBUS communication Class 2 starts by executing the function block "InitiateClass2" and then by executing the "WriteClass2" and "ReadClass2" function blocks. The acyclic communication can be stopped by using the function block "AbortClass2".

Two HART Commands function blocks have been developed by using the "WriteClass2" and "ReadClass2" function blocks. These functions blocks are available in the library "Profibus_LB_serie":

- The function block "HARTCommand0" is corresponding to Command 0 Read Unique Identifier.
- The function block "HARTCommand3" is corresponding to Command 3 Read Dynamic Variables and Loop Current.

4.1.2 Acyclic Communication Request/Response Area

- Eight channels are available for establishing Class 2 connection.

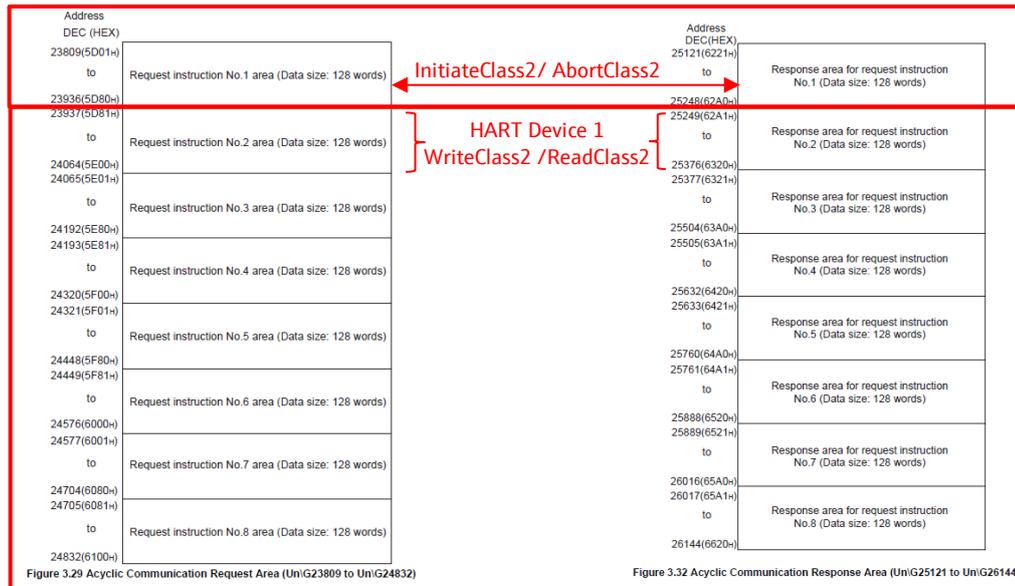
This is described in the QJ71PB92V card specification:

(1) Acyclic communication request area (Un\G23809 to Un\G24832)

Set the request instruction of acyclic communication in this area. (Initial value: 0000h)
 Up to eight request instructions can be set.
 For the format for request instructions, refer to Section 7.4.

(4) Acyclic communication response area (Un\G25121 to Un\G26144)

The execution result of acyclic communication is stored in this area. (Initial value: 0000h)
 For the response format for the execution result, refer to Section 7.4.



- In the Request and Responses Areas:
 - One channel is needed for the Initiate and Abort services.
 - The other seven channels are available for configuring the "WriteClass2" and "ReadClass2" function blocks. A write request is always followed by a read request.

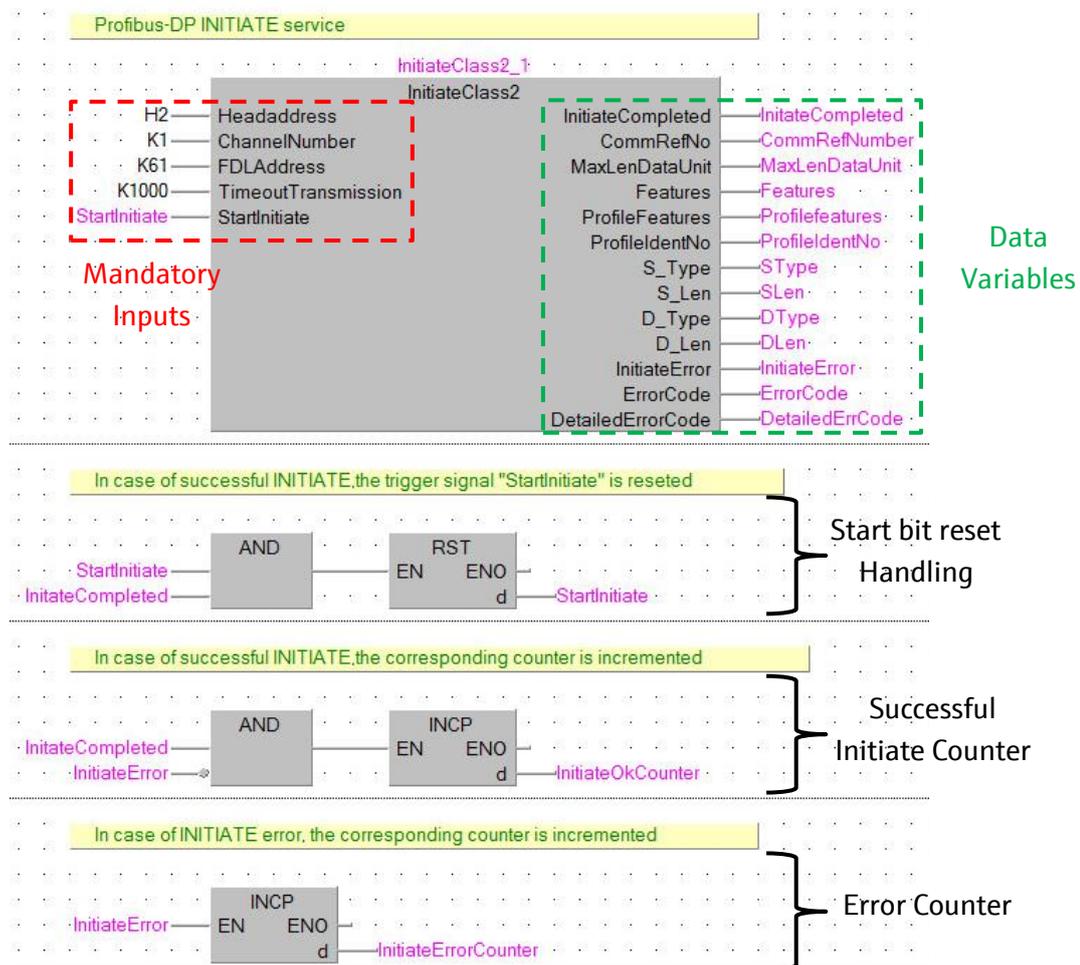
4.2 Function Blocks Configuration

The following example displays the configured function blocks. Refer to chapter 3 for all necessary relevant configuration steps (Create a program, add a function block in the program, assign variables,...).

4.2.1 Initiate the Acyclic DPV1 PROFIBUS Communication Class 2

This chapter explains how to configure the InitiateClass2 function block.

- InitiateClass2 Function Block configuration:



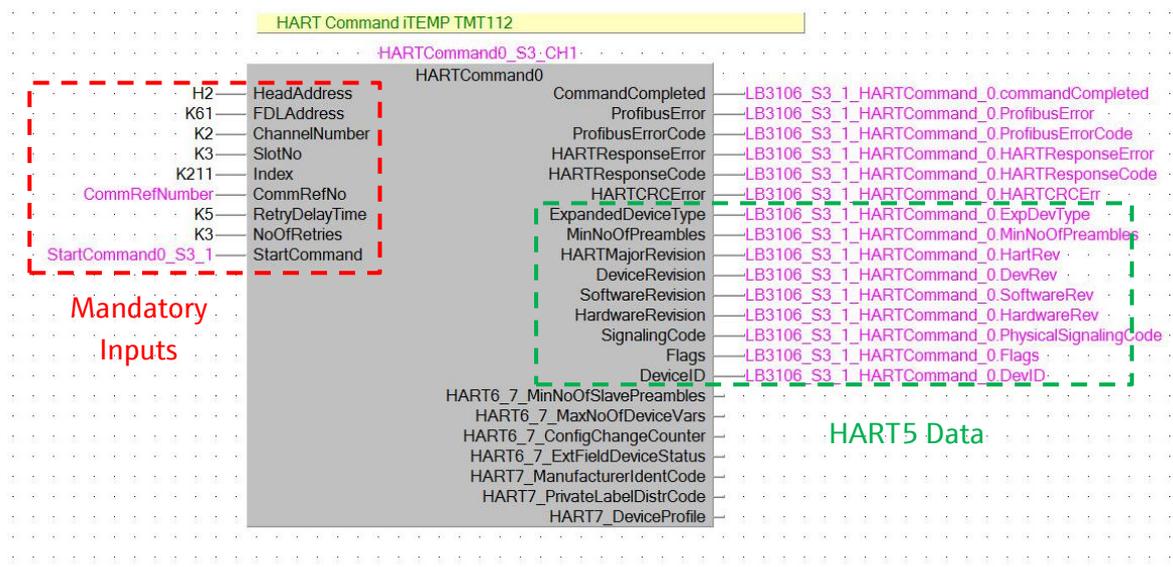
- InitiateClass2 Function Block Inputs
 - The “Headaddress” corresponds to the PROFIBUS Master Card QJ71PB92V Hexadecimal I/O number address divided per ten. In this example, the configured I/O address number is 0x20, that means $0x20/10 = \mathbf{0x02}$ (H2).
 - The “Channel Number” refers to the used memory registers for handling WriteClass2 and ReadClass2 function blocks as described in chapter 0. In this example, channel **1** is configured (K1).
 - The “FDL Address” corresponds to the Remote IO System PROFIBUS address. In this example, the address is **61** (=K61).
 - The “TimeoutTransmission” parameter is set to **K1000** for this example.
 - The “StartInitiate” bit is used to start the Initiate service.

4.2.2 HART Command 0 Read Unique Identifier

This chapter explains how to configure the HART Command 0 function block. This function block is standard for HART5, HART6 and HART7 devices.

4.2.2.1 HART5 Device

- HART Command 0 Function Block for a HART5 device:

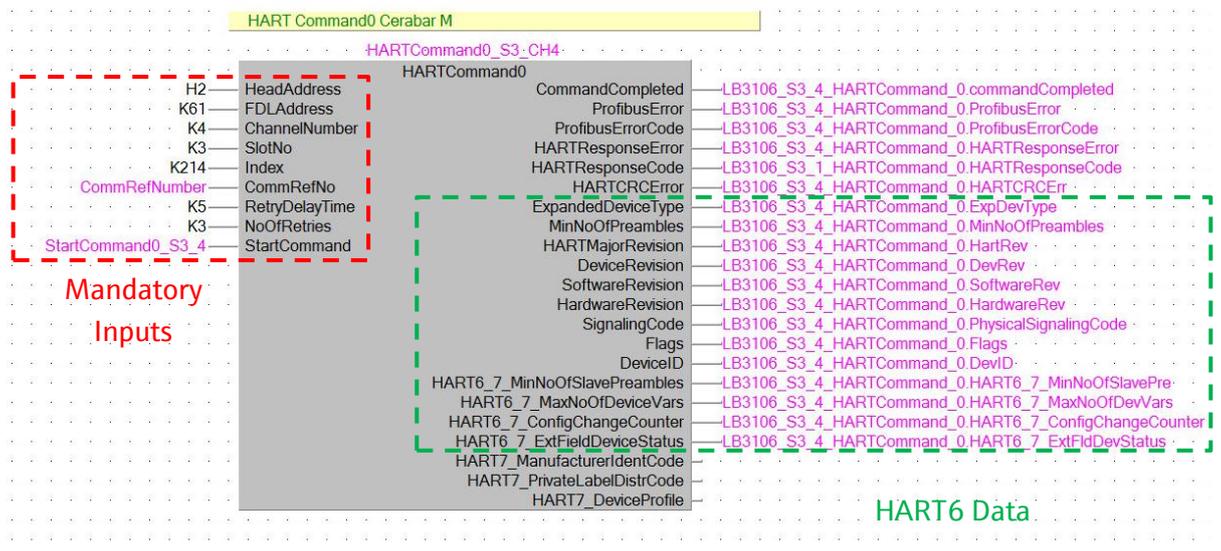


The signal "StartCommand0_S3_1" is reset when CommandComplete is



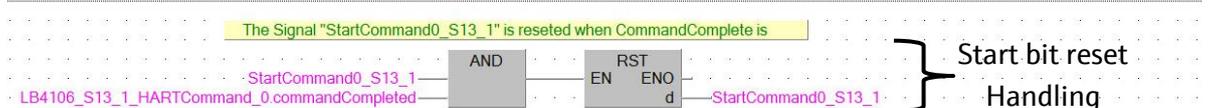
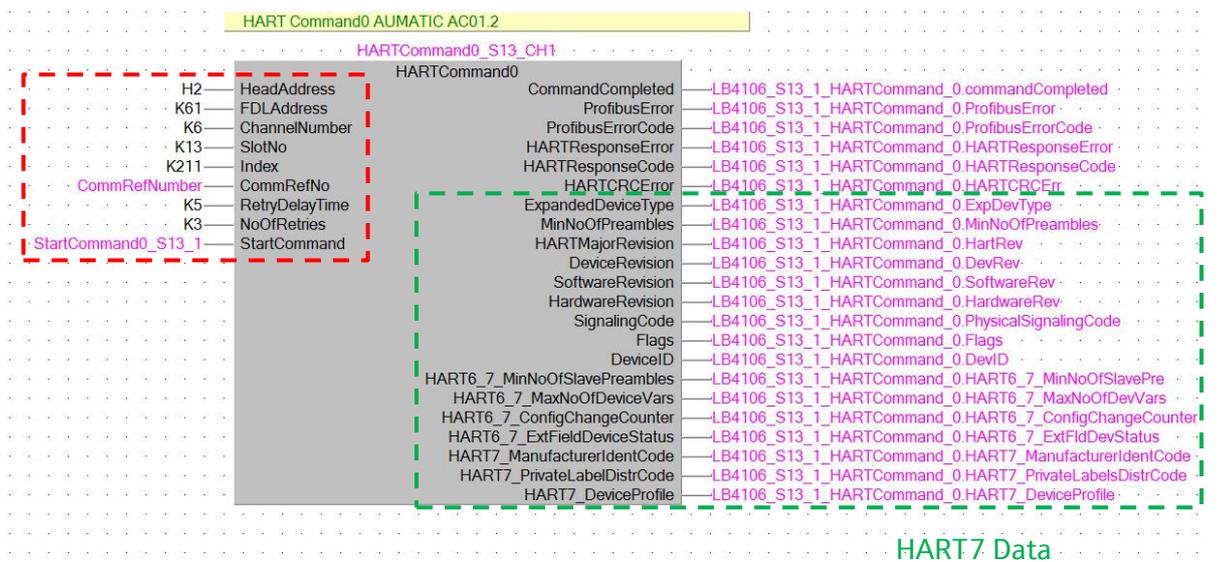
4.2.2.2 HART6 Device

- HART Command 0 Function Block for a HART6 device:



4.2.2.3 HART7 Device

- HART Command 0 Function Block for a HART7 device:



4.2.2.4 HART Command 0 Inputs

- The “Headaddress” corresponds to the PROFIBUS Master Card QJ71PB92V Hexadecimal I/O number address divided per ten. In this example, the configured I/O address number is 0x20, that means $0x20/10 = \mathbf{0x02}$ (H2).
- The “FDL Address” corresponds to the Remote IO System PROFIBUS address. In this example, the address is **61** (K61).
- The “Channel Number” refers to the used memory registers for handling WriteClass2 and ReadClass2 function blocks as described in chapter 0.
In this example, channel **2** (K2) is configured for the HART5 device, channel **4** (K4) for the HART6 device and channel **6** (K6) for the HART7 device.
- The “SlotNo” parameter corresponds to the Remote IO card Slot address on which the device is connected. Refer to chapter 3.2.3 for checking the configured Slot number.
In this example, the slot number is **3** (K3) for the HART5/6 devices and slot **13** (K13) for the HART7 device.
- The “Index” parameter corresponds to the channel number of a slot. Channel1, 2, 3 and 4 correspond to Index 211, 212, 213 and 214.
In this example, the HART5 device is wired on slot3 channel**1** and the HART7 device is wired on slot13 channel **1**, this means Index **211** (K211). The HART6 device is wired on channel **4**, this means Index **214** (K214).
- The “CommRefNo” refers to the output variable “CommRefNo” of the InitiateClass2 function block.
- The “RetryDelayTime” parameter is set to K5 for this example (=500ms).
- The “NoOfRetry” parameter is set to K3 for this example.
- The “StartCommand” bit is used to start the HART Command 0 function block.

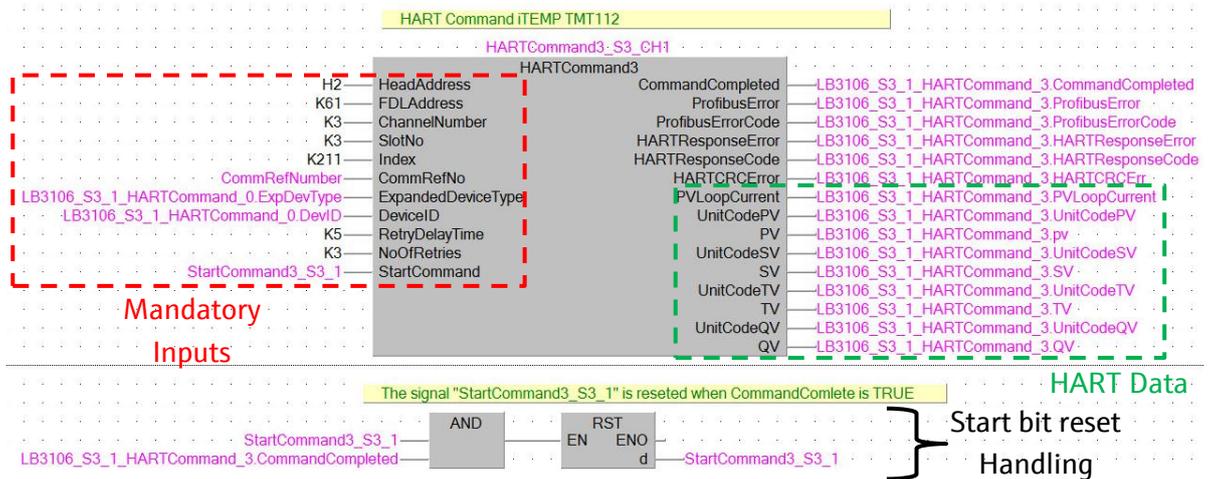
4.2.3 HART Command 3 Read Dynamic Variables and Loop Current

This chapter explains how to configure the HART Command 3 function block. The HART Command 3 Function block Inputs are the same for HART5, HART6 and HART7 devices. The received HART Data depends on the field device configuration.

HART Command3 requires two parameters received with HART Command 0, the Expanded Device Type and the deviceID. **In consequence, HART Command 3 cannot be executed before having executed HART Command 0.**

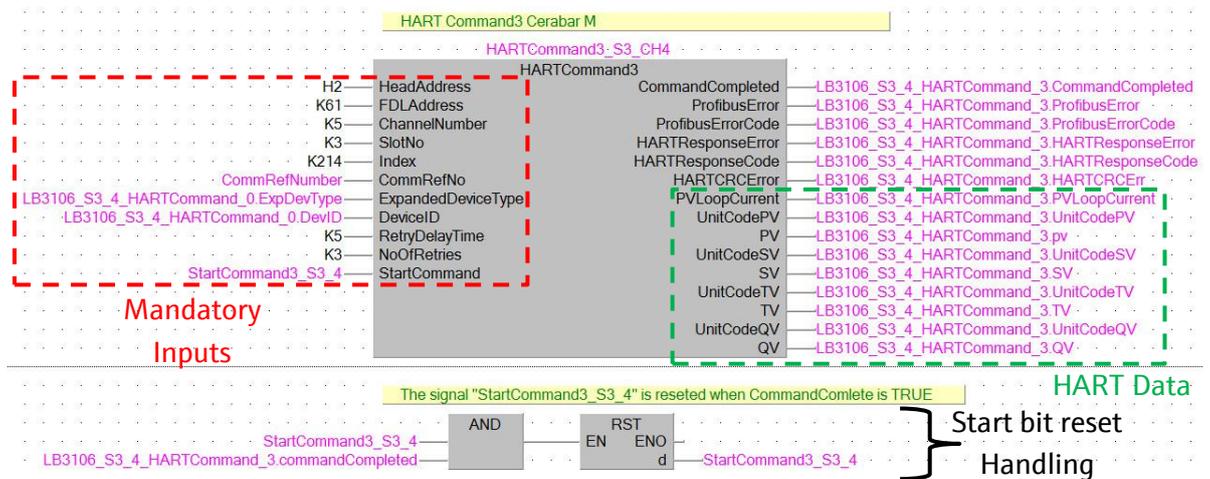
4.2.3.1 HART5 Device

- HART Command 3 Function Block for a HART5 device:



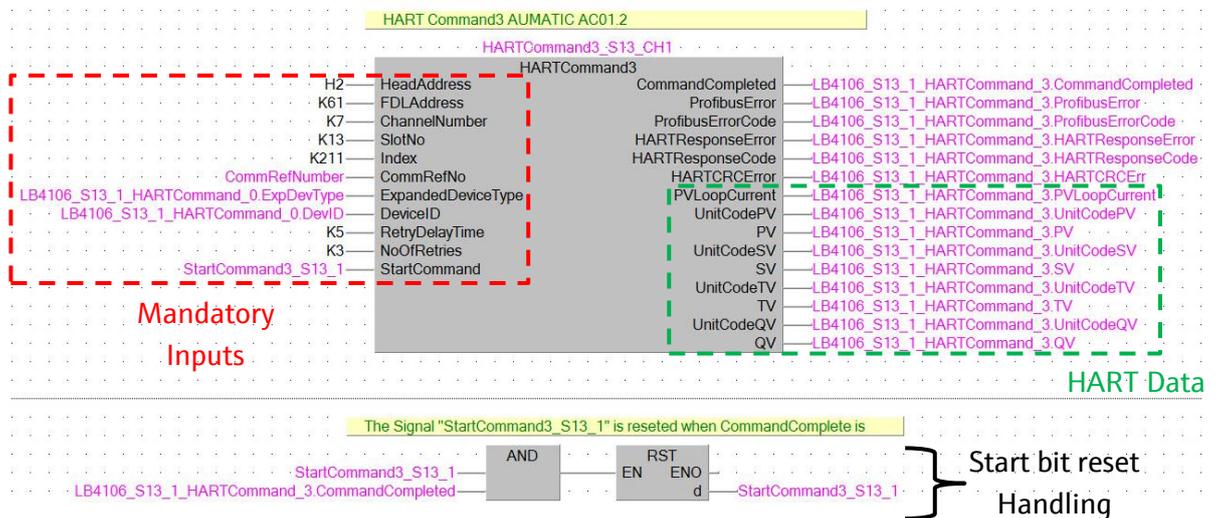
4.2.3.2 HART6 Device

- HART Command 3 Function Block for a HART6 device:



4.2.3.3 HART7 Device

- HART Command 3 Function Block for a HART7 device:



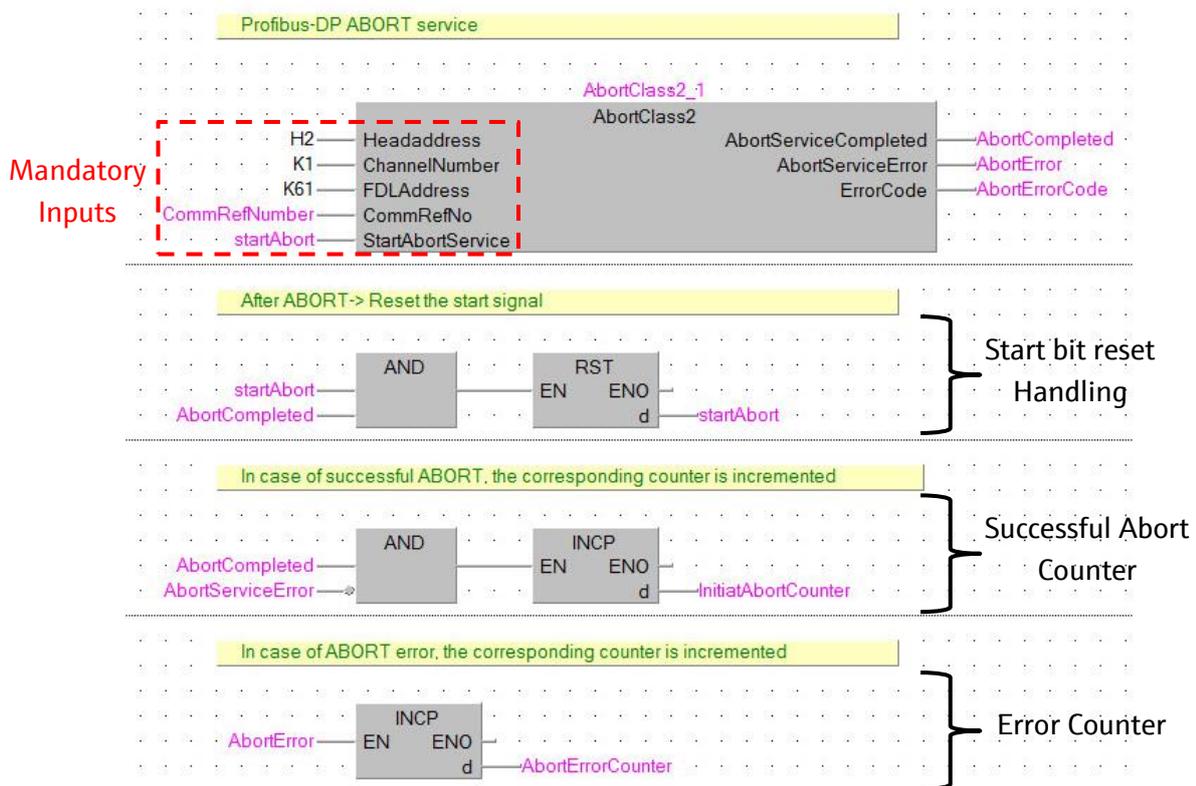
4.2.3.4 HART Command 3 Inputs

- The "Headaddress" corresponds to the PROFIBUS Master Card QJ71PB92V Hexadecimal I/O number address divided per ten. In this example, the configured I/O address number is 0x20, that means $0x20/10 = 0x02$ (H2).
- The "FDL Address" corresponds to the Remote IO System PROFIBUS address. In this example, the address is **61** (K61).
- The "Channel Number" refers to the used memory registers for handling WriteClass2 and ReadClass2 function blocks as described in chapter 0. In this example, channel **3** (K3) is configured for the HART5 device, channel **5** (K5) for the HART6 device and channel **7** (K7) for the HART7 device.
- The "SlotNo" parameter corresponds to the Remote IO card Slot address on which the device is connected. Refer to chapter 3.2.3 for checking the configured Slot number. In this example, the slot number is **3** (K3) for the HART5/6 devices and slot **13** (K13) for the HART7 device.
- The "Index" parameter corresponds to the channel number of a slot. Channel1, 2, 3 and 4 correspond to Index 211, 212, 213 and 214. In this example, the HART5 device is wired on slot3 channel**1** and the HART7 device is wired on slot13 channel**1**, this means Index **211** (K211). The HART6 device is wired on channel4, this means Index **214** (K214).

- The "CommRefNo" refers to the output variable "CommRefNo" of the InitiateClass2 function block.
- The "Expanded Device Type" parameter is received with HART Command0.
- The "DeviceID" parameter is received with HART Command0.
- The "RetryDelayTime" parameter is set to K5 for this example (=500ms).
- The "NoOfRetry" parameter is set to K3 for this example.
- The "StartCommand" bit is used to start the HART Command 0 function block.

4.2.4 Abort the Acyclic DPV1 PROFIBUS Communication Class 2

- AbortClass2 Function Block configuration

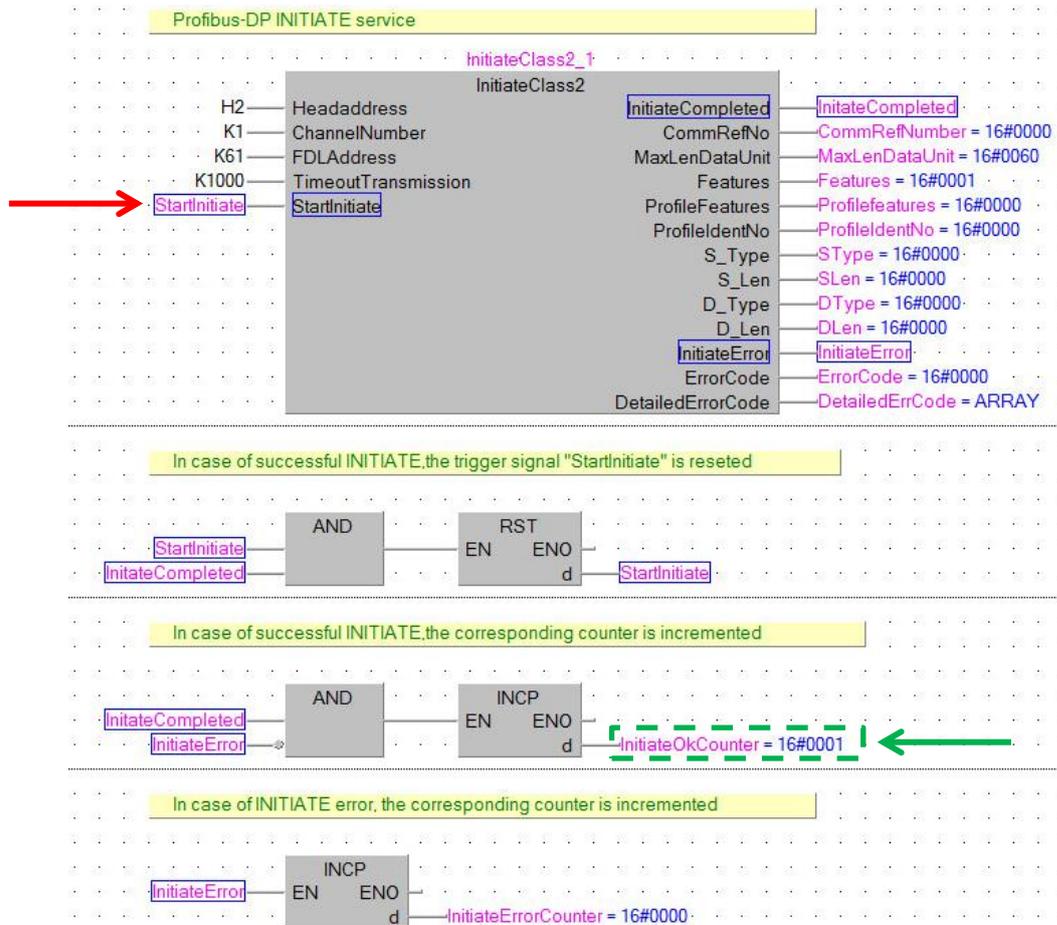


- AbortClass2 Function Block Inputs
 - The “Headaddress” corresponds to the PROFIBUS Master Card QJ71PB92V Hexadecimal I/O number address divided per ten. In this example, the I/O address number is 0x20, that means $0x20/10 = 0x02 \rightarrow H2$).
 - The “Channel Number” refers to the used memory registers for handling WriteClass2 and ReadClass2 function blocks as described in chapter 0. In this example, channel 1 is configured (K1).
 - The “FDL Address” corresponds to the Remote IO System PROFIBUS address. In this example, the address is **61** (K**61**).
 - The “CommRefNo” refers to the output variable “CommRefNo” of the InitiateClass2 function block.
 - The “StartAbortService” bit is used to start the Abort service.

4.3 Online Monitoring

4.3.1 Initiate the Acyclic DPV1 PROFIBUS Communication Class 2

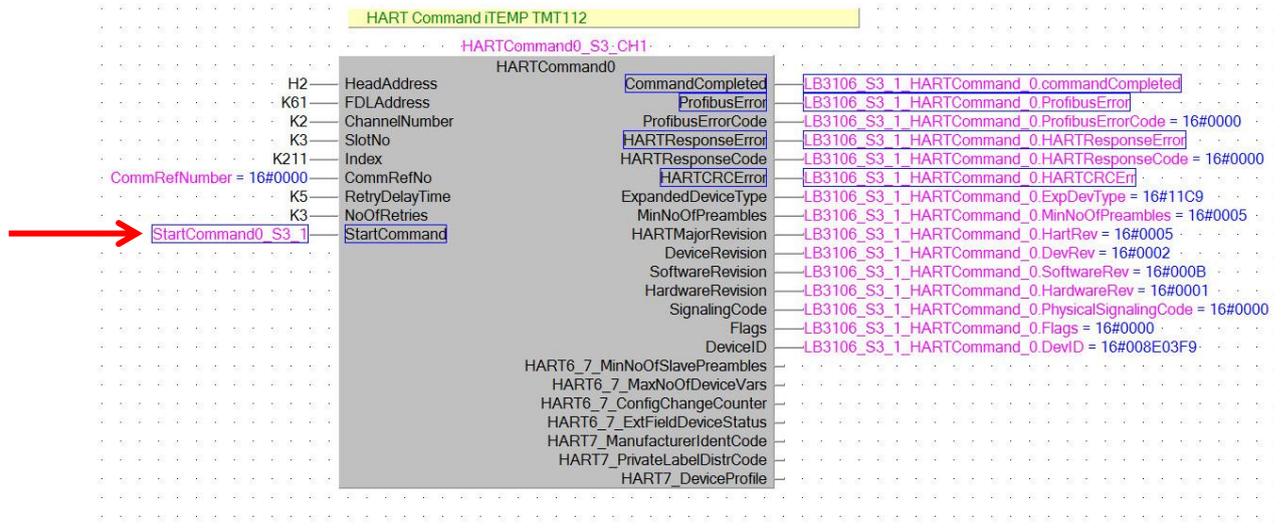
- The bit "startInitiate" is set once to TRUE to start the initiate process. In this example, the counter "InitiateOkCounter" has been incremented. That means the communication has been successfully initiated.



4.3.2 HART5 Device

The bit "StartCommand" needs to be triggered to start the HART command function blocks, at first for CMD0 and then for CMD3. The following example shows the online values of HART Command 0 and HART Command 3 results for the Endress+Hauser temperature HART5 transmitter iTEMP TMT112.

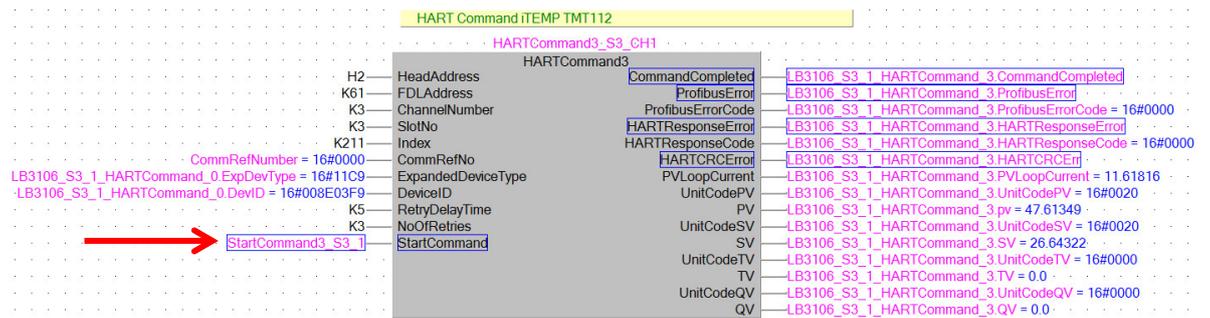
- HART Command 0



The signal "StartCommand0_S3_1" is reset when CommandComplete is



- HART Command 3



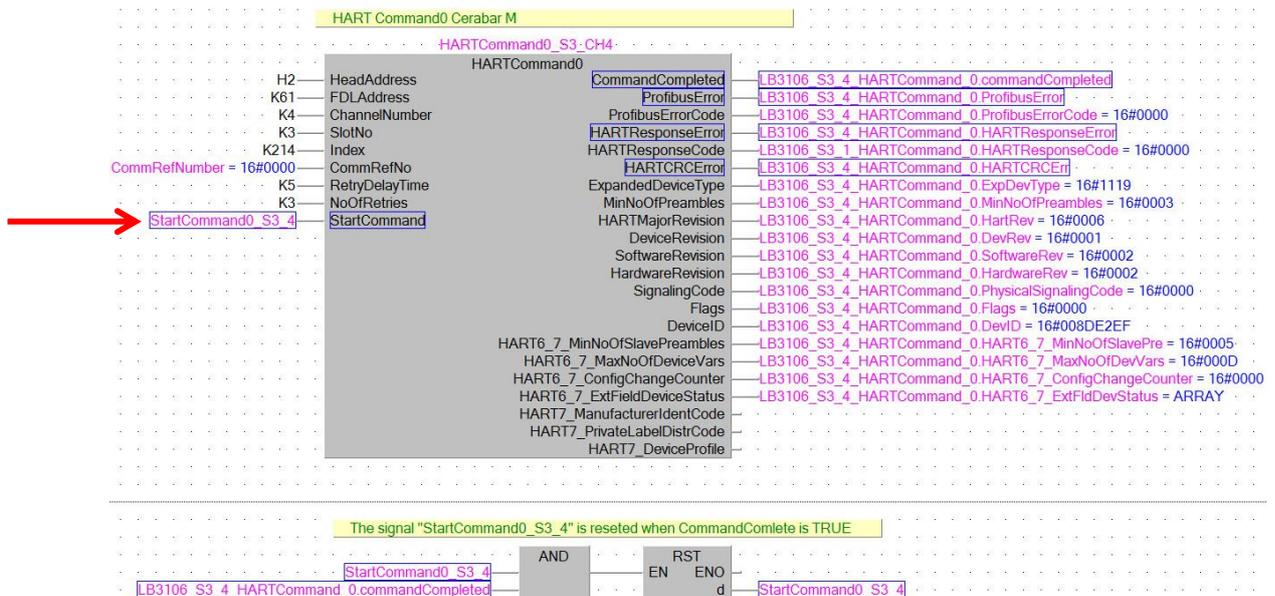
The signal "StartCommand3_S3_1" is reset when CommandComplete is TRUE



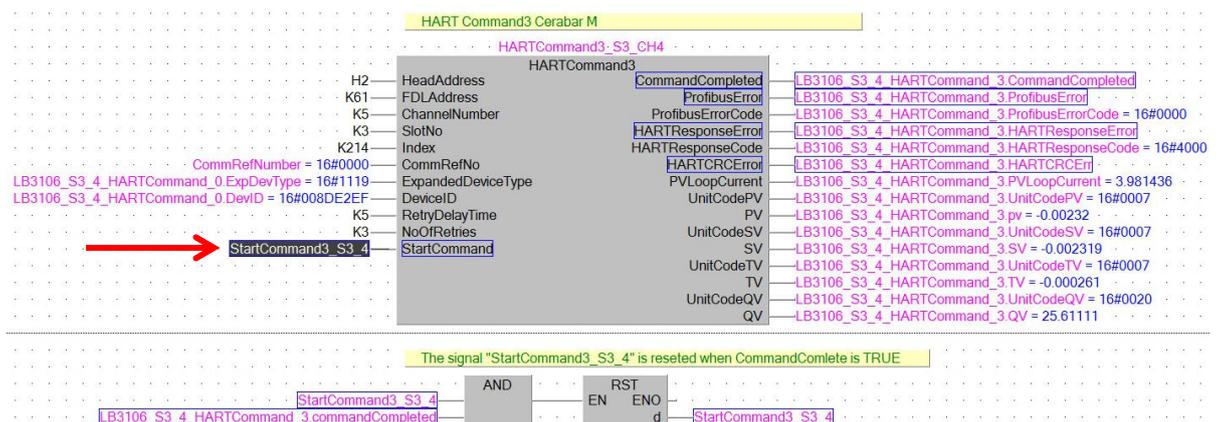
4.3.3 HART6 Device

The bit "StartCommand" needs to be triggered to start the HART command function blocks, at first for CMD0 and then for CMD3. The following example shows the online values of HART Command 0 and HART Command 3 results for the Endress+Hauser HART6 absolute and gauge pressure transmitter Cerabar M.

- HART Command 0



- HART Command 3



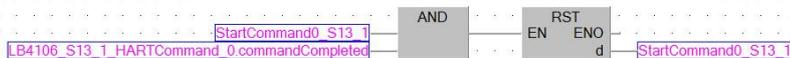
4.3.4 HART7 Device

The bit "StartCommand" needs to be triggered to start the HART command function blocks, at first for CMD0 and then for CMD3. The following example shows the online values of HART Command 0 and HART Command 3 results for the AUMA HART7 Actuator AUMATIC AC01.2.

- HART Command0

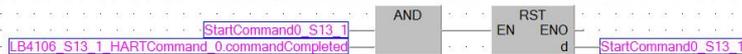
HART Command0 AUMATIC AC01.2			
HARTCommand0_S13_CH1			
H2	HeadAddress	CommandCompleted	LB4106_S13_1_HARTCommand_0.commandCompleted
K61	FDLAddress	ProfibusError	LB4106_S13_1_HARTCommand_0.ProfibusError
K6	ChannelNumber	ProfibusErrorCode	LB4106_S13_1_HARTCommand_0.ProfibusErrorCode = 16#0000
K13	SlotNo	HARTResponseError	LB4106_S13_1_HARTCommand_0.HARTResponseError
K211	Index	HARTResponseCode	LB4106_S13_1_HARTCommand_0.HARTResponseCode = 16#5000
CommRefNumber = 16#0000	CommRefNo	HARTCRCErr	LB4106_S13_1_HARTCommand_0.HARTCRCErr
K5	RetryDelayTime	ExpandedDeviceType	LB4106_S13_1_HARTCommand_0.ExpDevType = 16#E1FD
K3	NoOfRetries	MinNoOfPreambles	LB4106_S13_1_HARTCommand_0.MinNoOfPreambles = 16#0005
StartCommand0_S13_1	StartCommand	HARTMajorRevision	LB4106_S13_1_HARTCommand_0.HartRev = 16#0007
		DeviceRevision	LB4106_S13_1_HARTCommand_0.DevRev = 16#0002
		SoftwareRevision	LB4106_S13_1_HARTCommand_0.SoftwareRev = 16#0002
		HardwareRevision	LB4106_S13_1_HARTCommand_0.HardwareRev = 16#0002
		SignalingCode	LB4106_S13_1_HARTCommand_0.PhysicalSignalingCode = 16#0000
		Flags	LB4106_S13_1_HARTCommand_0.Flags = 16#0001
		DeviceID	LB4106_S13_1_HARTCommand_0.DevID = 16#00198197
	HART6_7_MinNoOfSlavePreambles	LB4106_S13_1_HARTCommand_0.HART6_7_MinNoOfSlavePre = 16#0005	
	HART6_7_MaxNoOfDeviceVars	LB4106_S13_1_HARTCommand_0.HART6_7_MaxNoOfDevVars = 16#000C	
	HART6_7_ConfigChangeCounter	LB4106_S13_1_HARTCommand_0.HART6_7_ConfigChangeCounter = 16#0100	
	HART6_7_ExtFldDeviceStatus	LB4106_S13_1_HARTCommand_0.HART6_7_ExtFldDevStatus = ARRAY	
	HART7_ManufacturerIdentCode	LB4106_S13_1_HARTCommand_0.HART7_ManufacturerIdentCode = 16#7C60	
	HART7_PrivateLabelDistrCode	LB4106_S13_1_HARTCommand_0.HART7_PrivateLabelsDistrCode = 16#7C60	
	HART7_DeviceProfile	LB4106_S13_1_HARTCommand_0.HART7_DeviceProfile = 16#0001	

The Signal "StartCommand0_S13_1" is reseted when CommandComplete is



- HART Command 3 (Configured set point: 10%)

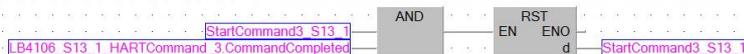
The Signal "StartCommand0_S13_1" is reseted when CommandComplete is



HART Command3 AUMATIC AC01.2

HARTCommand3_S13_CH1			
H2	HeadAddress	CommandCompleted	LB4106_S13_1_HARTCommand_3.CommandCompleted
K61	FDLAddress	ProfibusError	LB4106_S13_1_HARTCommand_3.ProfibusError
K7	ChannelNumber	ProfibusErrorCode	LB4106_S13_1_HARTCommand_3.ProfibusErrorCode = 16#0000
K13	SlotNo	HARTResponseError	LB4106_S13_1_HARTCommand_3.HARTResponseError
K211	Index	HARTResponseCode	LB4106_S13_1_HARTCommand_3.HARTResponseCode = 16#5000
CommRefNumber = 16#0000	CommRefNo	HARTCRCErr	LB4106_S13_1_HARTCommand_3.HARTCRCErr
LB4106_S13_1_HARTCommand_0.ExpDevType = 16#E1FD	ExpandedDeviceType	PVLoopCurrent	LB4106_S13_1_HARTCommand_3.PVLoopCurrent = 5.59
LB4106_S13_1_HARTCommand_0.DevID = 16#00198197	DeviceID	UnitCodePV	LB4106_S13_1_HARTCommand_3.UnitCodePV = 16#0039
K5	RetryDelayTime	PV	LB4106_S13_1_HARTCommand_3.PV = 9.9
K3	NoOfRetries	UnitCodeSV	LB4106_S13_1_HARTCommand_3.UnitCodeSV = 16#0039
StartCommand3_S13_1	StartCommand	SV	LB4106_S13_1_HARTCommand_3.SV = 9.9
		UnitCodeTV	LB4106_S13_1_HARTCommand_3.UnitCodeTV = 16#0000
		TV	LB4106_S13_1_HARTCommand_3.TV = 0.0
		UnitCodeQV	LB4106_S13_1_HARTCommand_3.UnitCodeQV = 16#0000
		QV	LB4106_S13_1_HARTCommand_3.QV = 0.0

The Signal "StartCommand3_S13_1" is reseted when CommandComplete is

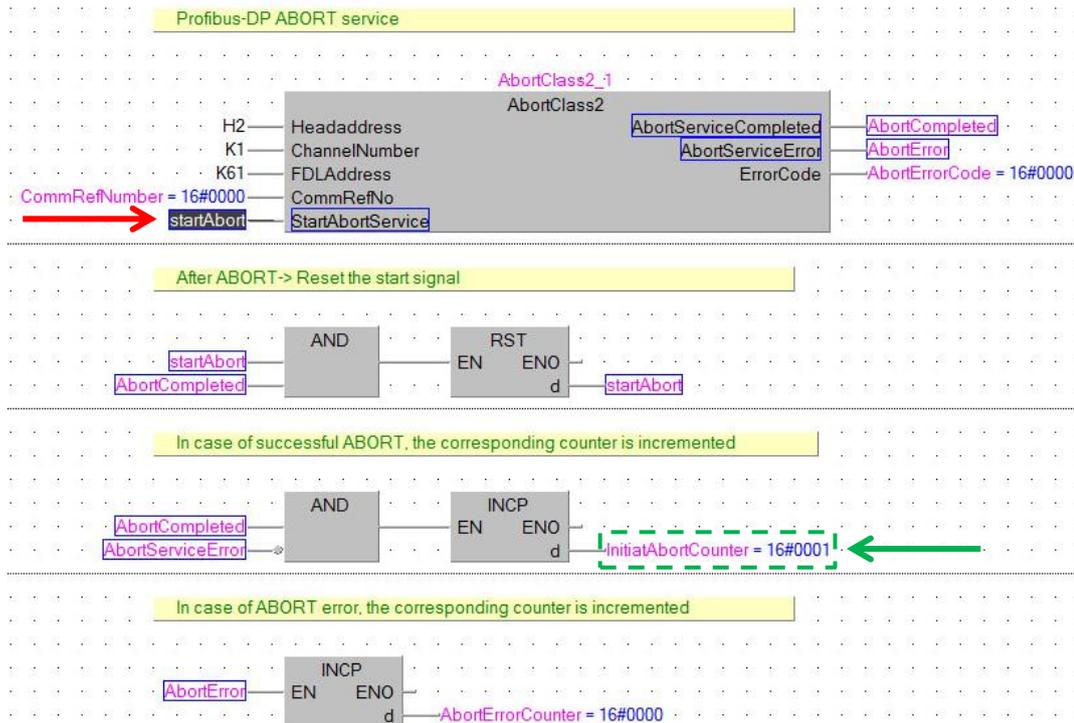


Remark:

Set point position (PV) and actual position values (SV) received via HART Command3 are identical as these one received via deviceDTM in chapter 5.5.2.

4.3.5 Abort the Acyclic DPV1 PROFIBUS Communication Class 2

- The bit "startAbort" is set once to TRUE to start the abort process.
 In this example, the counter "IntiateAbortCounter" has been incremented. That means the communication has been successfully aborted.



5 Routed Tool Integration

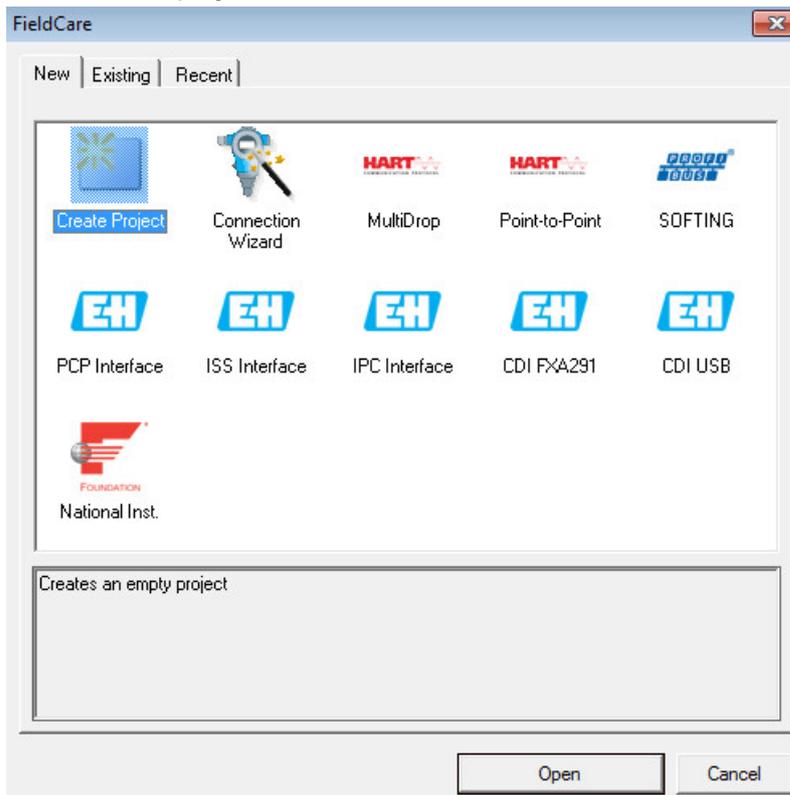
This chapter describes the main workflow for integration of Mitsubishi Electric and Pepperl+Fuchs system components to the Endress+Hauser Plant Asset Management (PAM system) by means of Communication DTMs. As a result, the Endress+Hauser PAM system can access underlying PROFIBUS Pepperl+Fuchs Remote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

5.1 Mitsubishi MX CommDTM-PBDP Configuration

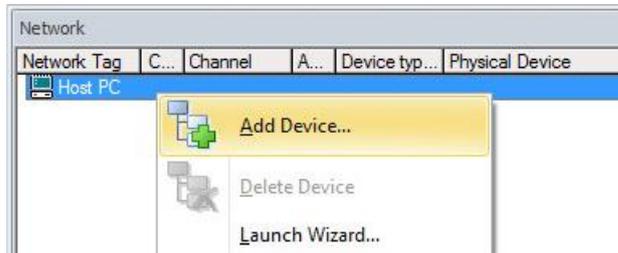
- Start the application FieldCare.



- Create a new project.



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



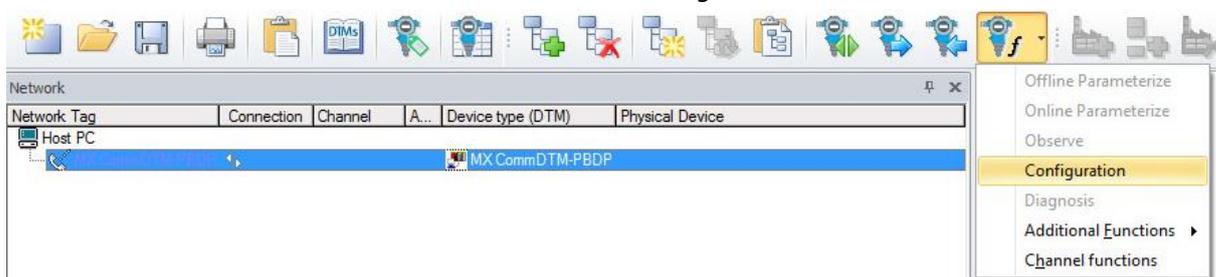
- Select the commDTM "MX CommDTM-PBDP" and click on the button "OK".

IPC (Level, Pressure) FXA193/291	V1.02.17 (2014-02-21)	-	Endress+Hauser	IPC
MX CommDTM-PBDP	V3.0 (2011-05-25)	-	Mitsubishi Electric Europe B.V.	Profibus DP/V1
PCP (Readwin) TXU10/FXA291	V1.01.18 (2014-02-21)	-	Endress+Hauser	PCP

- The commDTM "MX CommDTM-PBDP" is inserted in the project view.

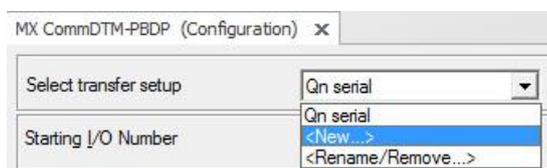


- Select the CommDTM and select the function "F→Configuration" in the tool bar.

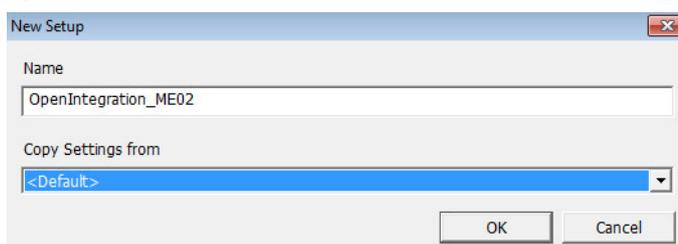


- In the MX CommDTM-PBDP configuration tab :

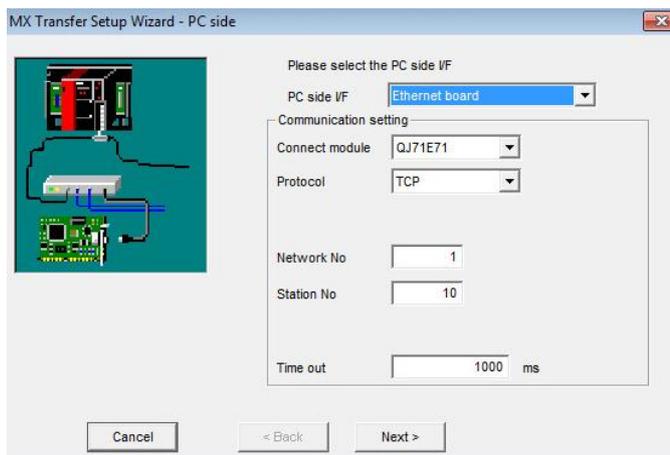
- Select the field "New" in the menu "Select transfer setup".



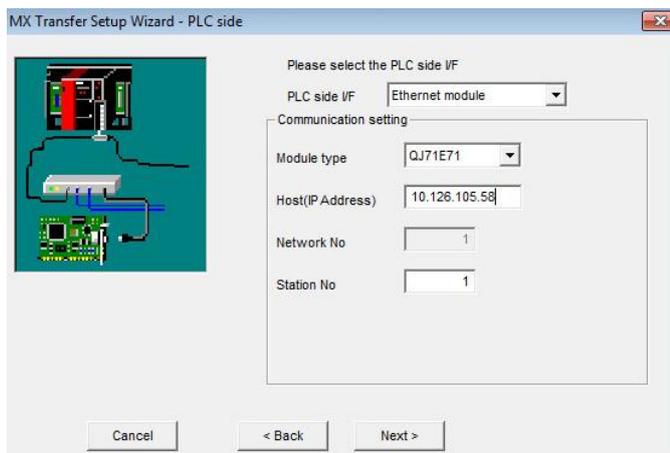
- Enter a new Name, "OpenIntegration_ME02" in this example, and click on the button "OK".



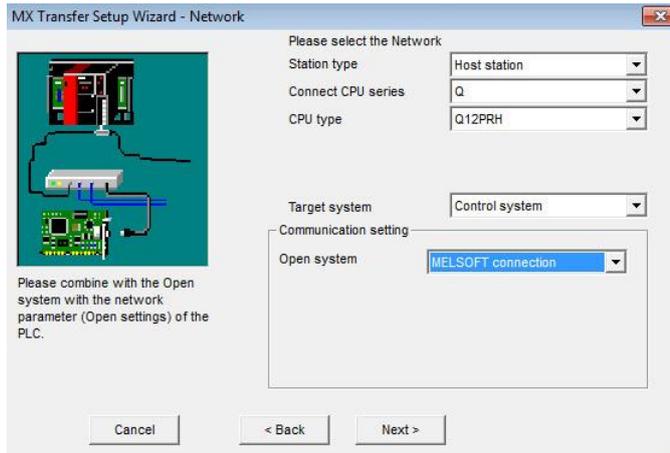
- Configure following settings (PC Side):
 - PC side I/F : Ethernet board
 - Connected module : QJ71E71
 - Protocol: TCP
 - Network No: 1 (specific for this example)
 - Station No: 10 (specific for this example)
 - Click on the button "Next".



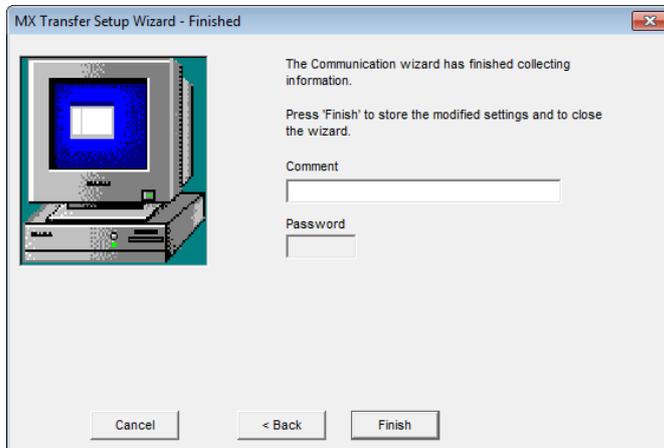
- Configure following settings (PLC Side):
 - PLC side I/F: Ethernet module
 - Module type: QJ71E71
 - Host (IP Address): 10.126.105.58 (Specific for this example)
 - Station No: 1 (specific for this example)
 - Click on the button "Next".



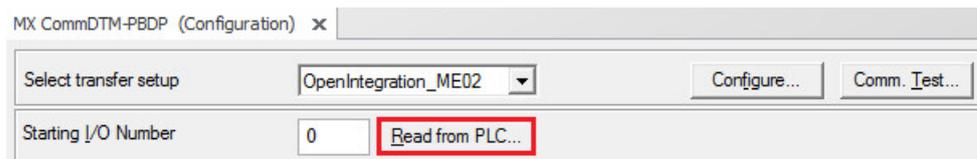
- Configure following settings:
 - Station type: "Host station"
 - Connect CPU series "Q"
 - CPU type "Q12PRH"
 - Target system: "Control system"
 - Open system: "MELSOFT connection"
 - Click on the button "Next".



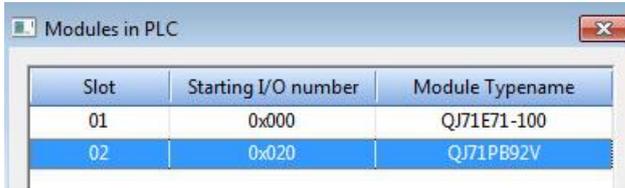
- Click on the button "Finish" to validate the configuration.



- In the MX CommDTM-PBDP Tab, click on the button "Read from PLC".

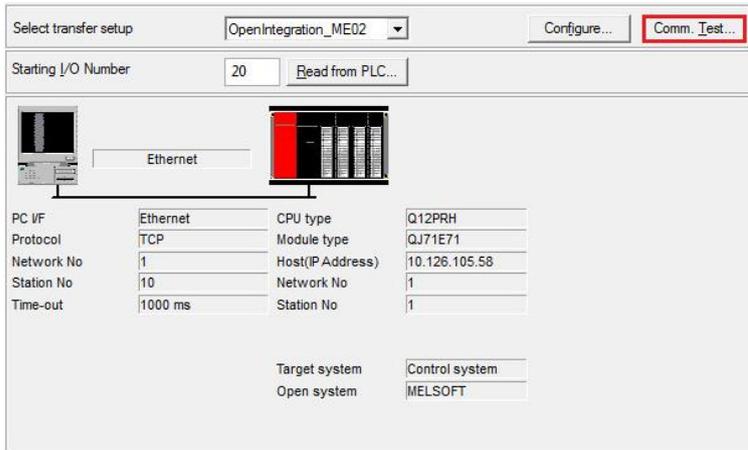


- Select the PROFIBUS master module QJ71PB92V.



Slot	Starting I/O number	Module Typename
01	0x000	QJ71E71-100
02	0x020	QJ71PB92V

- Click on the button "Comm. Test" to verify if the connection is established.



Select transfer setup: OpenIntegration_ME02 [Configure...] **Comm. Test...**

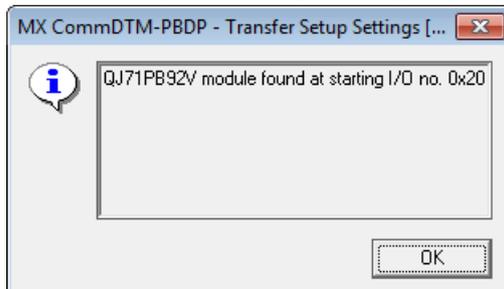
Starting I/O Number: 20 [Read from PLC...]

Ethernet

PC I/F	Ethernet	CPU type	Q12PRH
Protocol	TCP	Module type	QJ71E71
Network No	1	Host(IP Address)	10.126.105.58
Station No	10	Network No	1
Time-out	1000 ms	Station No	1

Target system: Control system
Open system: MELSOFT

- If successfully, following message is displayed.

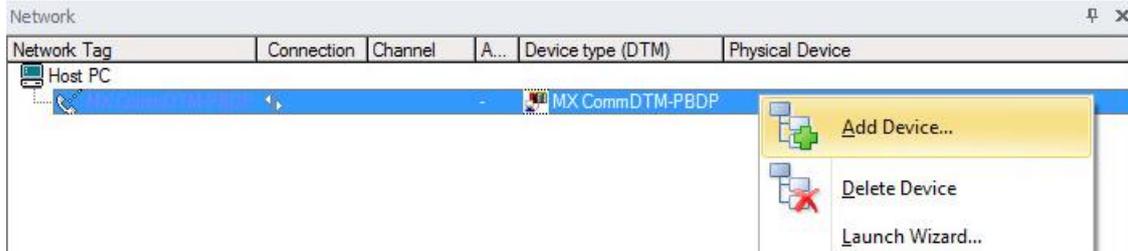


5.2 Pepperl+Fuchs Remote IO System Configuration

5.2.1 Com Unit LB8109

5.2.1.1 LB8109 PROFIBUS Address

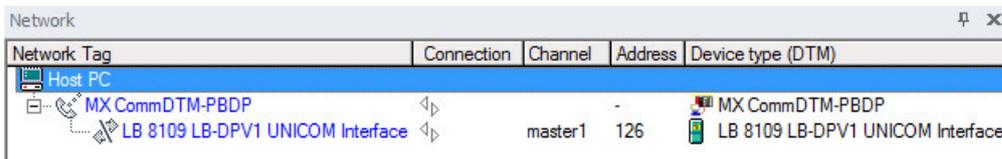
- Right-click on the new CommDTM "MX CommDTM-PBDP" and select the menu "Add Device".



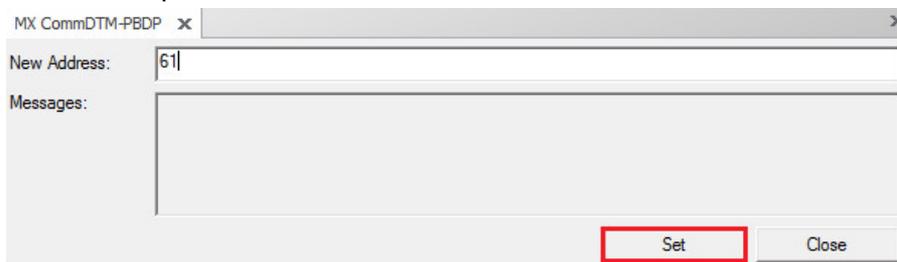
- Select the commDTM "LB 8109 LB-DPV1 UNICOM Interface".

FB 8205 FB-DPV1 Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
FB 8206 FB-EasyCom Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
FB 8209 FB-DPV1 UNICOM Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
LB 8105 LB-DPV1 Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
LB 8106 LB-EasyCom Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
LB 8109 LB-DPV1 UNICOM Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus

- The commDTM "LB 8109 LB-DPV1 UNICOM Interface" is inserted in the project with PROFIBUS address 126.



- Once the commDTM "LB 8109 LB-DPV1 UNICOM Interface" is inserted in the project, the tab "MX CommDTM-PBDP" is automatically opened in order to configure the PROFIBUS address. In this example, the PROFIBUS address is 61. Click on the button "Set" to validate.



- This updates the PROFIBUS address in the project view. Close the window.

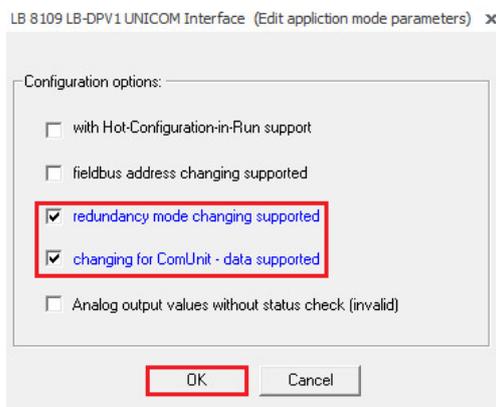


5.2.1.2 LB8109 Settings

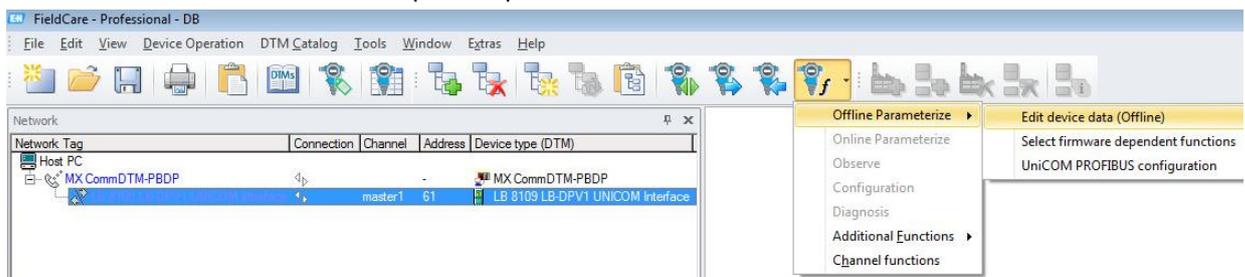
- Select the commDTM “LB 8109 LB-DPV1 UNICOM Interface” and click on the menu “F→Additional Functions→Edit application mode parameters”.



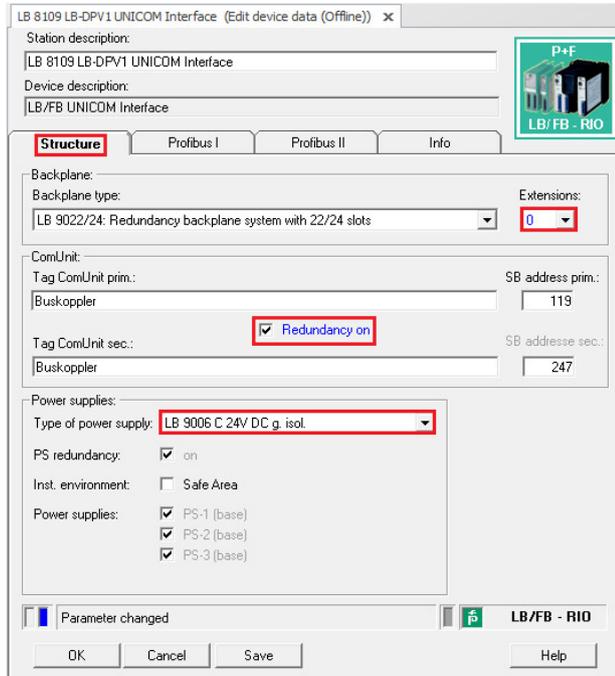
- Select following options and click on the button “OK”:



- Select the commDTM “LB 8109 LB-DPV1 UNICOM Interface” and click on the menu “F→Offline Parameterize→Edit device data (Offline)”.



- Configure the settings of the “Structure” part:
 - No Extension Modules are used in this example: select the option “Extensions = 0”.
 - The redundancy concept is used in this example: select the option “redundancy on”.
 - Check that the type of power supply is matching with the installed one.



LB 8109 LB-DPV1 UNICOM Interface (Edit device data (Offline)) x

Station description:
LB 8109 LB-DPV1 UNICOM Interface

Device description:
LB/FB UNICOM Interface

Structure Profibus I Profibus II Info

Backplane:
Backplane type: LB 9022/24: Redundancy backplane system with 22/24 slots Extensions: 0

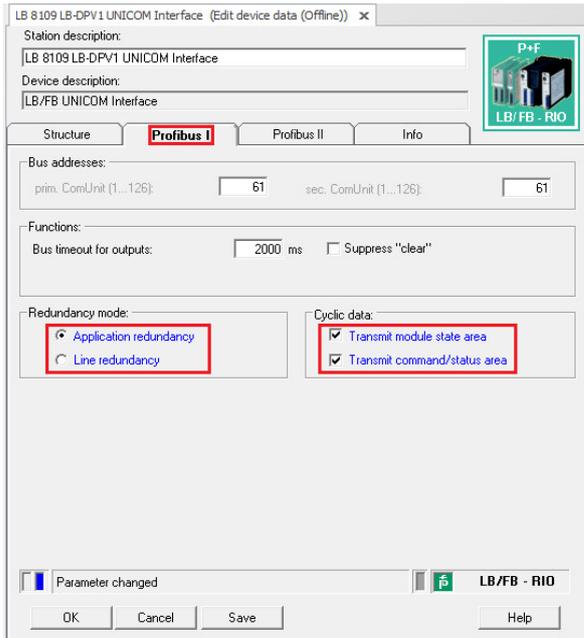
ComUnit:
Tag ComUnit prim.: Buskoppler SB address prim.: 119
Tag ComUnit sec.: Redundancy on SB address sec.: 247

Power supplies:
Type of power supply: LB 9006 C 24V DC g. isol.
PS redundancy: on
Inst. environment: Safe Area
Power supplies: PS-1 (base)
 PS-2 (base)
 PS-3 (base)

Parameter changed LB/FB - RIO

OK Cancel Save Help

- Click on the tab "Profibus I" and configure following settings:
 Select the redundancy mode "Application line".
 Select the options "Transmit module state area" and "Transmit command/status area".
 The PROFIBUS address of the Com Unit cannot be changed because in this example because the option has not been selected in the menu "F→Additional Functions→Edit application mode parameters".



LB 8109 LB-DPV1 UNICOM Interface (Edit device data (Offline)) x

Station description:
LB 8109 LB-DPV1 UNICOM Interface

Device description:
LB/FB UNICOM Interface

Structure **Profibus I** Profibus II Info

Bus addresses:
prim. ComUnit (1...126): 61 sec. ComUnit (1...126): 61

Functions:
Bus timeout for outputs: 2000 ms Suppress "clear"

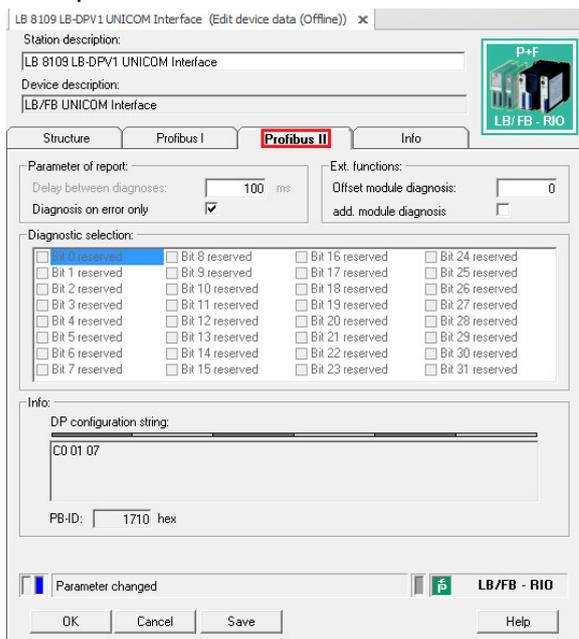
Redundancy mode:
 Application redundancy
 Line redundancy

Cyclic data:
 Transmit module state area
 Transmit command/status area

Parameter changed LB/FB - RIO

OK Cancel Save Help

- Click on the tab "Profibus II" to check configured settings. The default settings are used for this example.



LB 8109 LB-DPV1 UNICOM Interface (Edit device data (Offline)) x

Station description:
LB 8109 LB-DPV1 UNICOM Interface

Device description:
LB/FB UNICOM Interface

Structure Profibus I **Profibus II** Info

Parameter of report:
Delay between diagnoses: 100 ms
Diagnosis on error only:

Ext. functions:
Offset module diagnosis: 0
add. module diagnosis:

Diagnostic selection:

<input type="checkbox"/> Bit 0 reserved	<input type="checkbox"/> Bit 8 reserved	<input type="checkbox"/> Bit 16 reserved	<input type="checkbox"/> Bit 24 reserved
<input type="checkbox"/> Bit 1 reserved	<input type="checkbox"/> Bit 9 reserved	<input type="checkbox"/> Bit 17 reserved	<input type="checkbox"/> Bit 25 reserved
<input type="checkbox"/> Bit 2 reserved	<input type="checkbox"/> Bit 10 reserved	<input type="checkbox"/> Bit 18 reserved	<input type="checkbox"/> Bit 26 reserved
<input type="checkbox"/> Bit 3 reserved	<input type="checkbox"/> Bit 11 reserved	<input type="checkbox"/> Bit 19 reserved	<input type="checkbox"/> Bit 27 reserved
<input type="checkbox"/> Bit 4 reserved	<input type="checkbox"/> Bit 12 reserved	<input type="checkbox"/> Bit 20 reserved	<input type="checkbox"/> Bit 28 reserved
<input type="checkbox"/> Bit 5 reserved	<input type="checkbox"/> Bit 13 reserved	<input type="checkbox"/> Bit 21 reserved	<input type="checkbox"/> Bit 29 reserved
<input type="checkbox"/> Bit 6 reserved	<input type="checkbox"/> Bit 14 reserved	<input type="checkbox"/> Bit 22 reserved	<input type="checkbox"/> Bit 30 reserved
<input type="checkbox"/> Bit 7 reserved	<input type="checkbox"/> Bit 15 reserved	<input type="checkbox"/> Bit 23 reserved	<input type="checkbox"/> Bit 31 reserved

Info:
DP configuration sting:
CD 01 07

PB-ID: 1710 hex

Parameter changed LB/FB - RIO

OK Cancel Save Help

- Once one parameter is changed, its text color becomes blue and the message "Parameter changed" is displayed on the bottom of the tab "Edit device data (Offline)". Click on the button "Save" to save the settings.

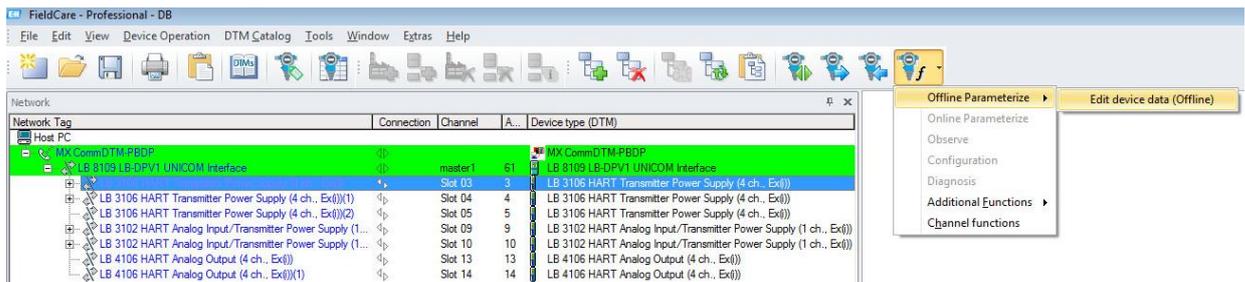


- Download the configuration as described in chapter 5.2.4.

5.2.2 LB3106 HART Transmitter Settings

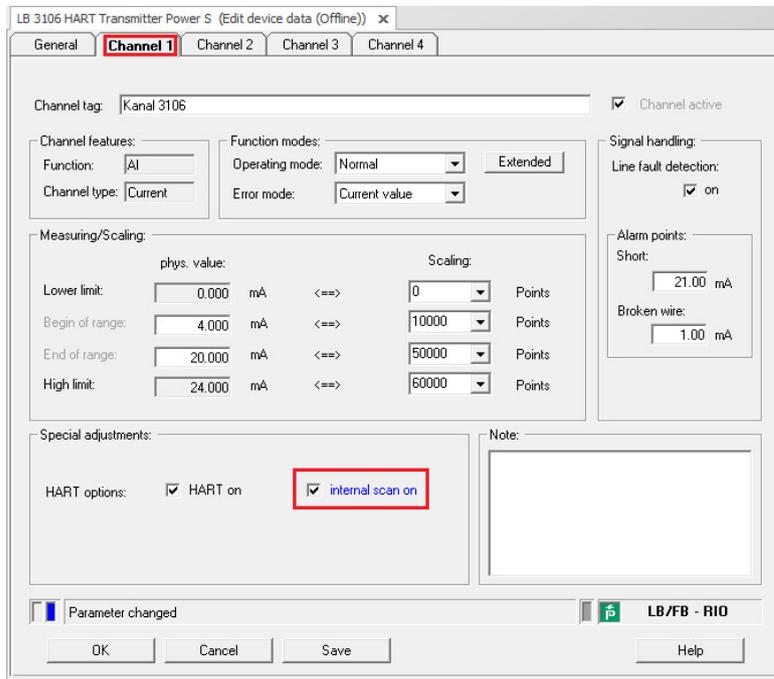
All three LB3106 cards are configured as follow:

- Right-click on the card LB3106 on slot 3 and select the option "F→Offline Parameterize→Edit device data (Offline)":



- Select the tab "Channel 1".

Default settings are used. Just the parameter "internal scan on" is set in order to activate the automatic scanning of IDs, tags and variables for HART communication.



- Configure the needed channels as this one and click on the button "Save".



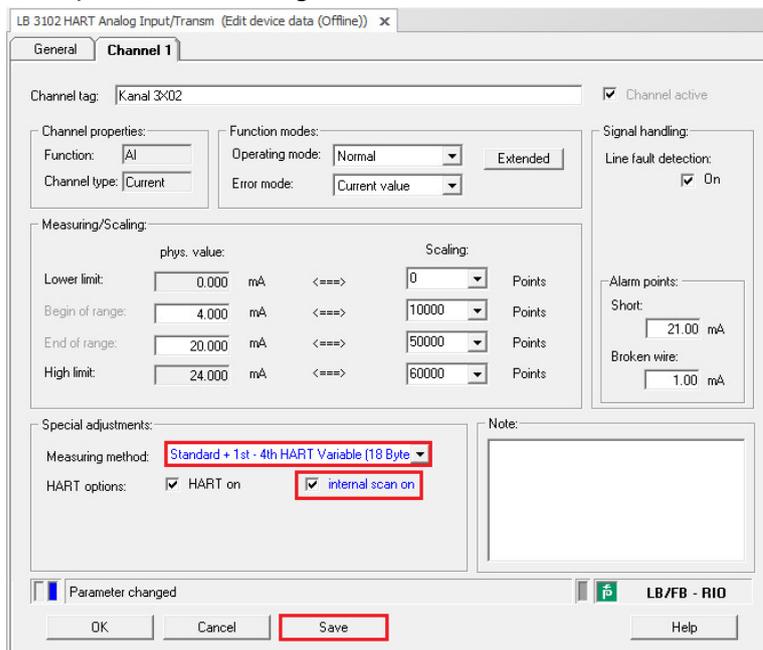
5.2.3 LB3102 HART Analog Input / Transmitter Settings

Both LB3102 cards are configured as follow:

- Right-click on the card LB3102 on slot 9 and select the option "F→Offline Parameterize→Edit device data (Offline)":



- Select the tab "Channel 1".
 Select at first the option "internal scan on" in order to activate the automatic scanning of IDs, tags and variables for HART communication. Then select the required "Measuring method". In this example, the Measuring method is "Standard+1st - 4th Variables (18 bytes)".



There exist 5 "Measuring Method" types on the LB3102 card:



- These 5 “Measuring method” correspond to the modules 15, 34, 35, 36 and 37 of the LB8109 *.gsd file.

```

Module = "3X02/3 Speisetrenner Hart" 0x50
15
SubSys_Module_Dir_Index(1) = 200
EndModule

Module = "3X02/3 Speisetr. Hart + 1 NV" 0x52
34
SubSys_Module_Dir_Index(1) = 200
EndModule

Module = "3X02/3 Speisetr. Hart + 1-2 NV" 0x54
35
SubSys_Module_Dir_Index(1) = 200
EndModule

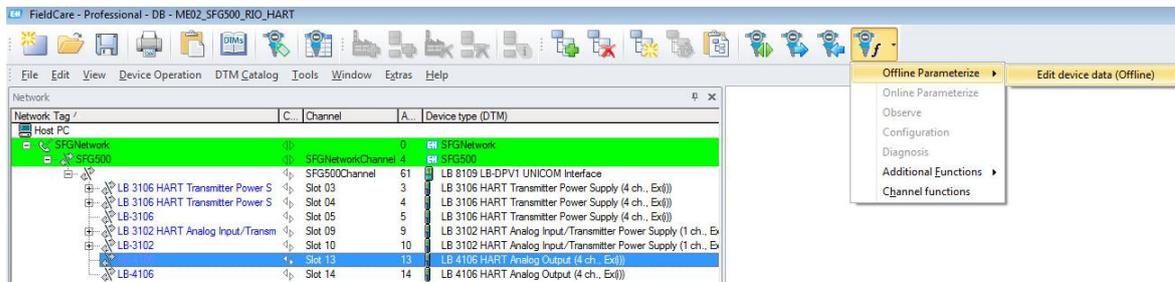
Module = "3X02/3 Speisetr. Hart + 1-3 NV" 0x56
36
SubSys_Module_Dir_Index(1) = 200
EndModule

Module = "3X02/3 Speisetr. Hart + 1-4 NV" 0x58
37
SubSys_Module_Dir_Index(1) = 200
EndModule
  
```

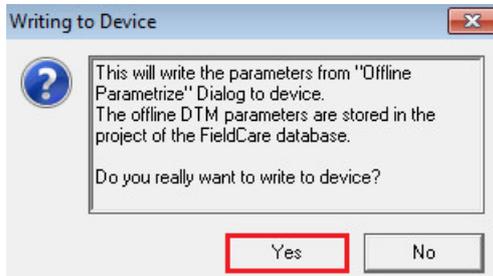
The configured Measuring method on the LB3102 card has to correspond to the correct IO Module in the Mitsubishi Slave configuration. In this example, the module “3X02/3 Speisetr. Hart+1-4NV” is configured on the Mitsubishi side, which corresponds to the Measuring method “Standard+1st - 4th Variables (18 bytes)”.

5.2.4 LB4106 HART Analog Output / Actuator Settings

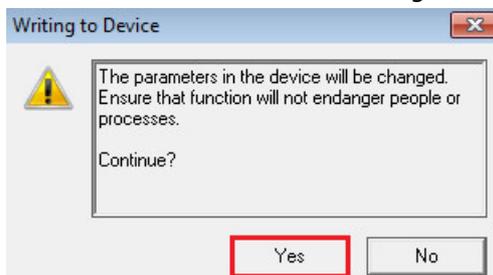
- Default settings are used.
Right-click on the card LB4106 on slot 13 and select the option “F→Offline Parameterize→Edit device data (Offline)”:



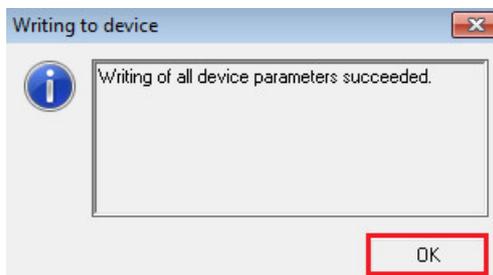
- Confirm the Writing to device by clicking on the button "Yes":



- Confirm another time the Writing to device by clicking on the button "Yes":



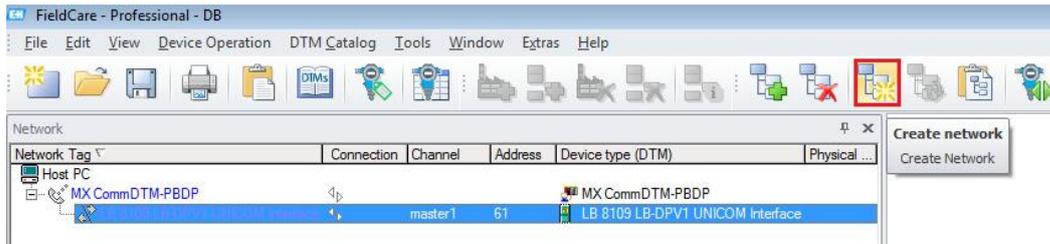
- When the download is finished, a message is displayed. Click on the button "OK" to close this window.



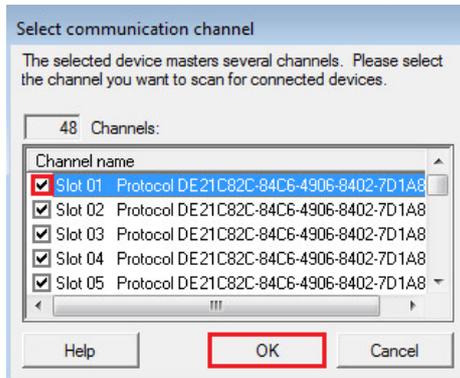
5.3 Project Network Scanning

5.3.1 Network Scanning with FieldCare Function "Create Network"

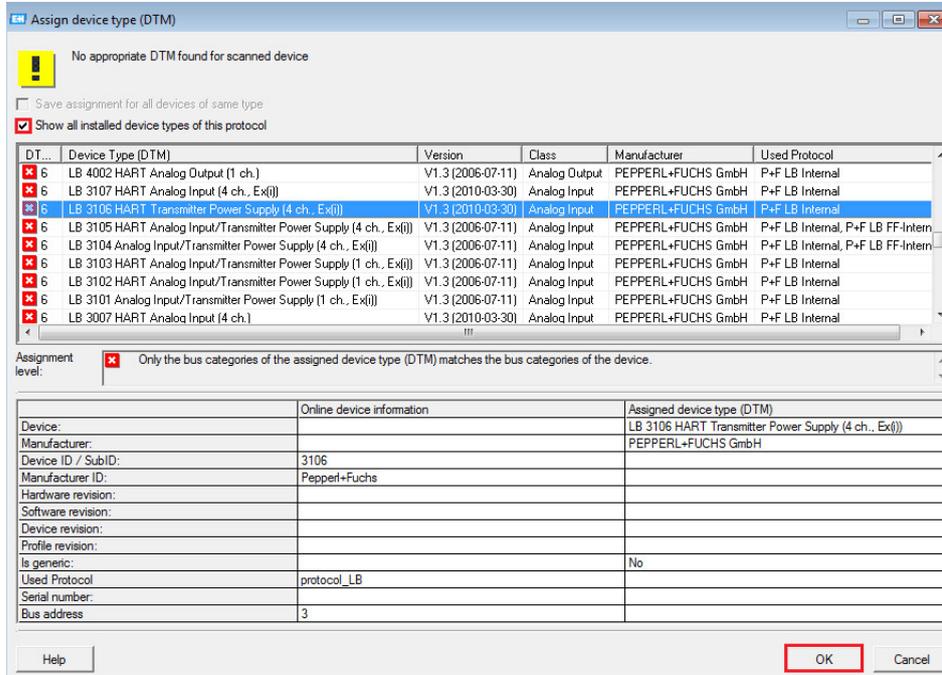
- Select the commDTM "LB 8109 LB-DPV1 UNICOM Interface" and click on the shortcut button "Create Network".



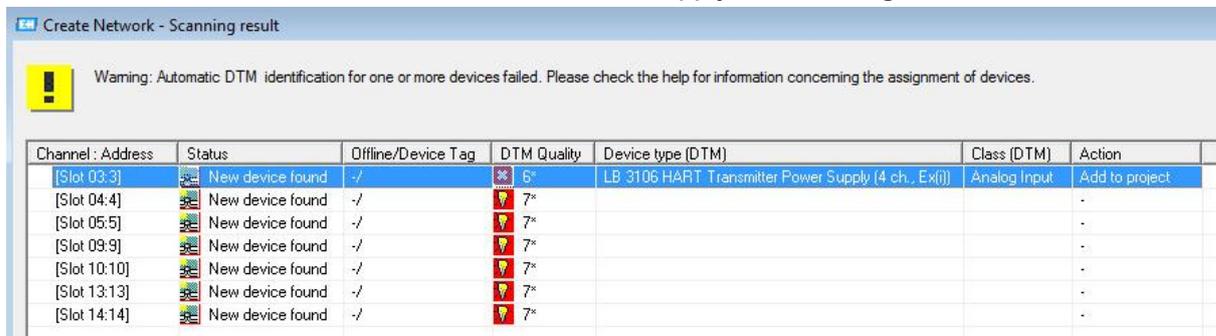
- Select the Pepperl+Fuchs backplane slots which need to be scanned and click on the button "OK".



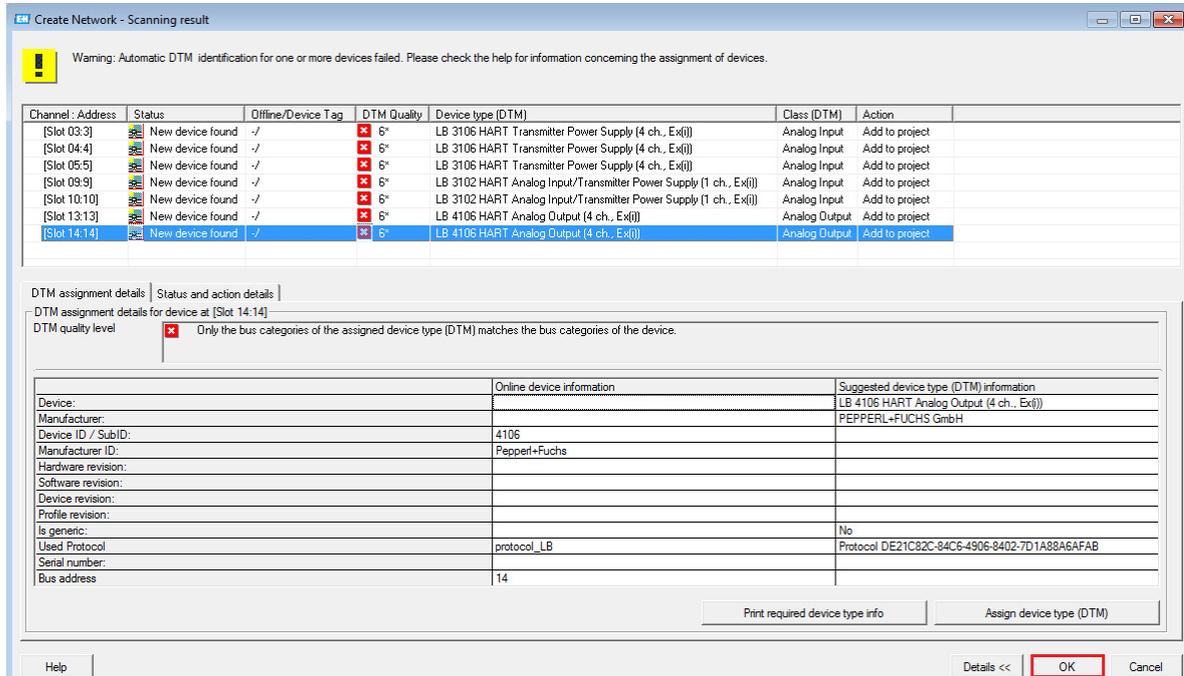
- Select the option “Show all installed device types of this protocol” , then choose the correct device DTM, “LB3106 HART Transmitter Power Supply” in this example and click on the “OK” to confirm.



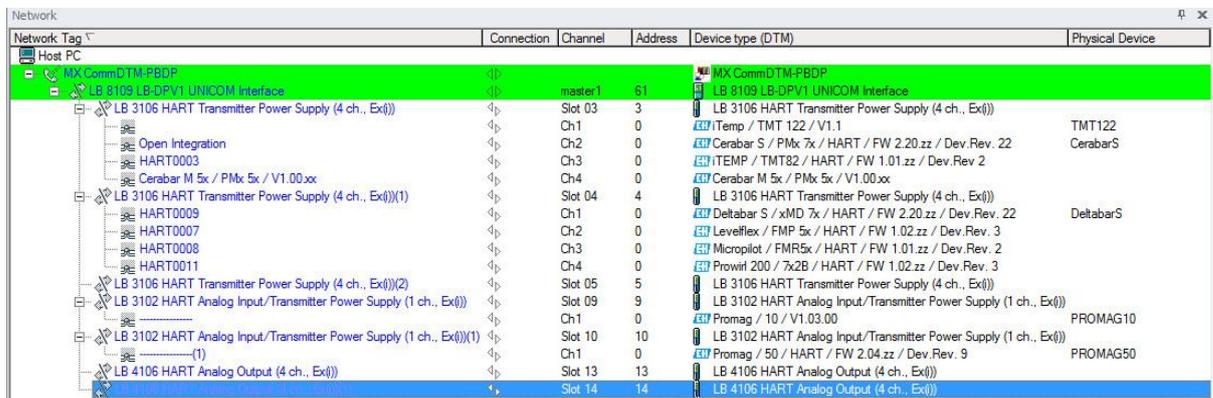
- The device DTM “LB3106 HART Transmitter Power Supply” is now assign to slot 03.



- Repeat the previous steps for all found cards and click on the button "OK" to confirm. Even if the DTM quality is indicated as bad (6), the scanning is performed correctly.



- All configured deviceDTMs are inserted in the project and the Scanning is carrying on. Found Endress+Hauser HART devices are automatically added in the project with the correct deviceDTM version.



5.3.2 Network Scanning with LB8109 commDTM Function "Topology Scan"

Another option to scan the network is to use the function "Topology Scan" of the commDTM "LB 8109 LB-DPV1 UNICOM Interface" in combination with the FieldCare functions "Verify Network" or "Create Network" (the "Topology Scan" function only scans the Pepperl+Fuchs Hardware).

The combination of the functions "Topology Scan" and "Verify Network" allows the operator to scan the complete network.

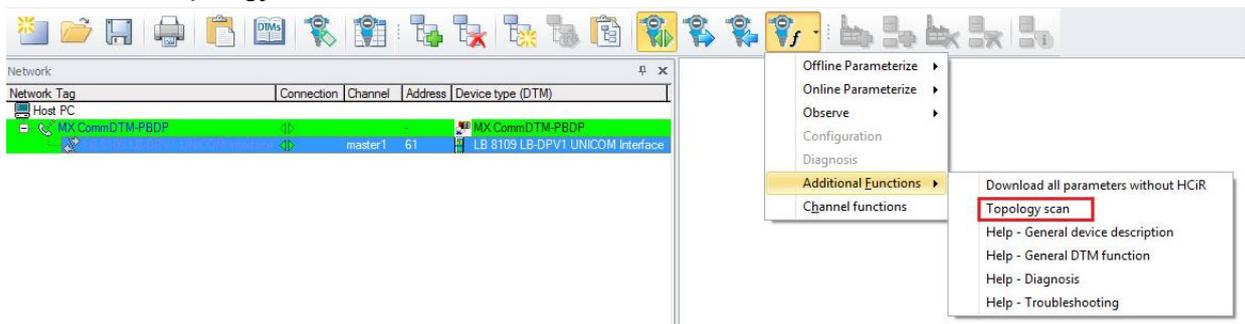
If the complete device topology is not needed, the operator can just scan the card on which the needed devices are connected by using the FieldCare function "Create Network". By this way, the operator has not to wait the complete scan.

5.3.2.1 Topology Scan

- Select the commDTM "LB 8109 LB-DPV1 UNICOM Interface" and click on the shortcut button "Connect".



- Select the commDTM "LB 8109 LB-DPV1 UNICOM Interface" and click on the menu "F→Additional Functions→Topology scan" to scan the connected Remote IO cards.



- Scanned cards are displayed. Click on the button "Create devices" to add the cards into the project.

LB 8109 LB-DPV1 UNICOM Interface (Topology scan) x

The result of the I/O scan will be displayed in the table below. Please select in the row "selected" the subtype of the scanned device. After that you can create the topology by clicking on the command button "Create devices" within the FDT container.

Create devices:
 plugged configured

Slot	plugged	configured	selected	subtype description
1	0x00	0x00	--	empty slot
2	0x00	0x00	--	empty slot
3	3x06	0x00	3106	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
4	3x06	0x00	3106	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
5	3x06	0x00	3106	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
6	0x00	0x00	--	empty slot
7	0x00	0x00	--	empty slot
8	0x00	0x00	--	empty slot
9	3x02	0x00	3102	LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
10	3x02	0x00	3102	LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
11	0x00	0x00	--	empty slot
12	0x00	0x00	--	empty slot
13	4x06	0x00	4106	LB 4106 HART Analog Output (4 ch., Ex(i))
14	4x06	0x00	4106	LB 4106 HART Analog Output (4 ch., Ex(i))
15	0x00	0x00	--	empty slot
16	0x00	0x00	--	empty slot
17	0x00	0x00	--	empty slot
18	0x00	0x00	--	empty slot
19	0x00	0x00	--	empty slot
20	0x00	0x00	--	empty slot
21	0x00	0x00	--	empty slot
22	0x00	0x00	--	empty slot
23	0x00	0x00	--	empty slot

Create devices Close

- Once all devices are added in the project, click on the button "Close" to close the window.

Create devices Close

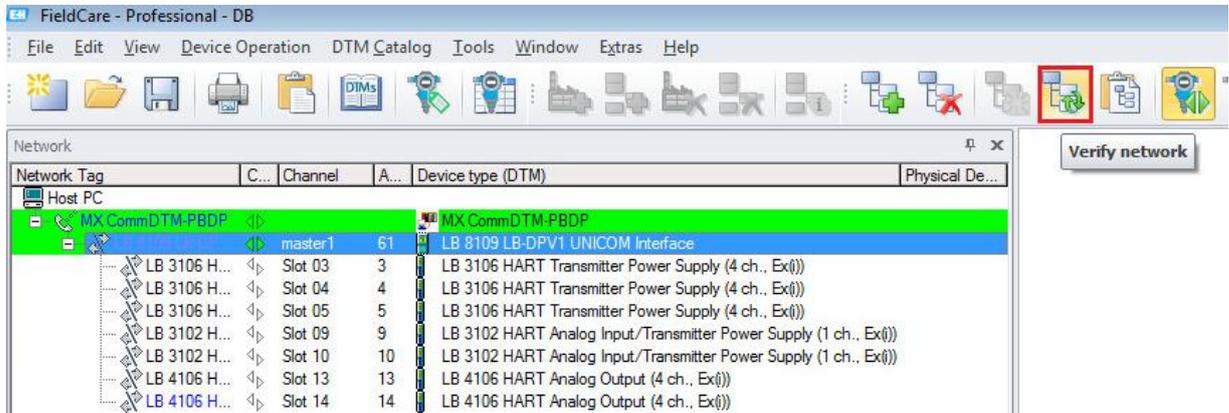
Topology was successfully created!

- Topology scan result:

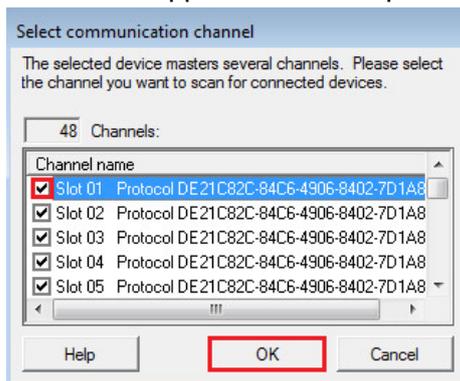
Network Tag	Connection	Channel	Address	Device type (DTM)
Host PC				
MX CommDTM-PBDP				MX CommDTM-PBDP
				LB 8109 LB-DPV1 UNICOM Interface
				LB 3106 HART Transmitter Power S
				LB 3106 HART Transmitter Power S
				LB 3106 HART Transmitter Power S
				LB 3106 HART Transmitter Power S
				LB 3102 HART Analog Input/Transm
				LB 3102 HART Analog Input/Transm
				LB 4106 HART Analog Output (4 ch
				LB 4106 HART Analog Output (4 ch

5.3.2.2 DeviceDTMs Scanning using the FieldCare Function “Verify Network”

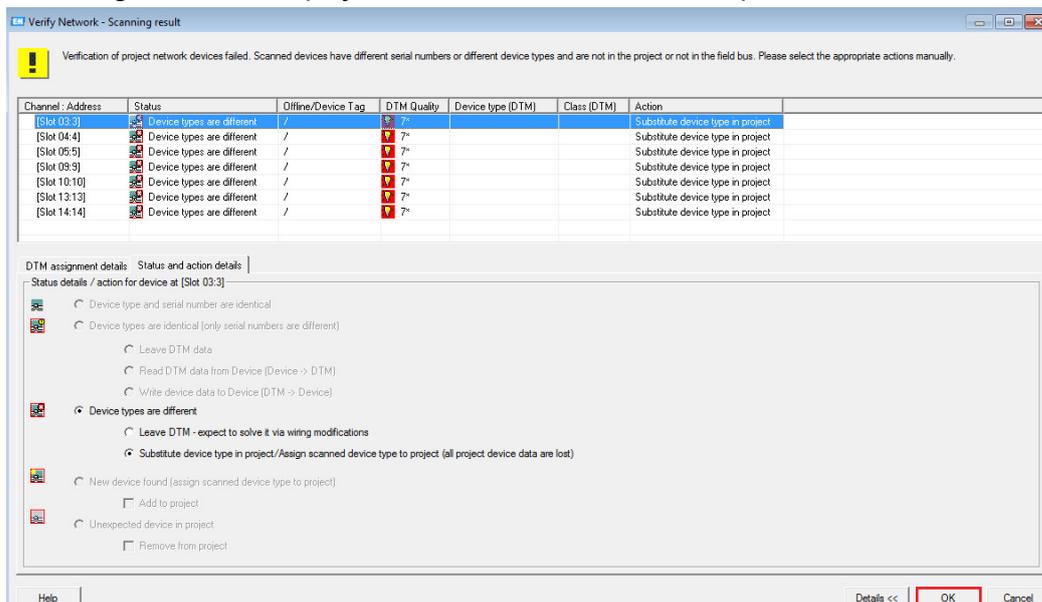
- Select the commDTM “LB 8109 LB-DPV1 UNICOM Interface” and click on the shortcut button “Verify Network”.



- Select the Pepperl+Fuchs backplane slots which need to be scanned and click on the button “OK”.



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

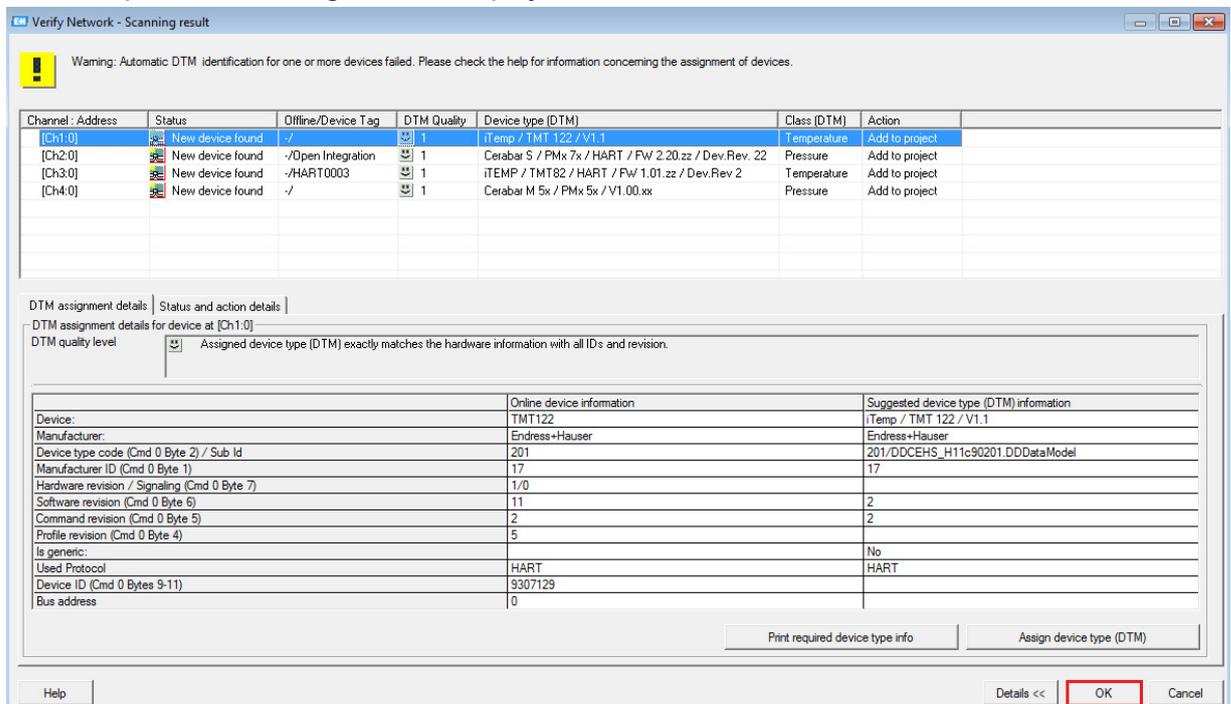


- Then click on the button "Yes".



- Each Remote IO card is scanned. If devices are found, a scanning result window is displayed. Click on the button "OK" to continue.

For example, the following window displayed the scanned devices on slot 03:



Warning: Automatic DTM identification for one or more devices failed. Please check the help for information concerning the assignment of devices.

Channel : Address	Status	Offline/Device Tag	DTM Quality	Device type (DTM)	Class (DTM)	Action
[Ch1.0]	New device found	-/-	1	iTemp / TMT 122 / V1.1	Temperature	Add to project
[Ch2.0]	New device found	-/Open Integration	1	Cerabar S / PMx 7x / HART / FW 2.20.zz / Dev.Rev. 22	Pressure	Add to project
[Ch3.0]	New device found	-/HART0003	1	iTEMP / TMT82 / HART / FW 1.01.zz / Dev.Rev 2	Temperature	Add to project
[Ch4.0]	New device found	-/-	1	Cerabar M 5x / PMx 5x / V1.00.xx	Pressure	Add to project

DTM assignment details | Status and action details |

DTM assignment details for device at [Ch1.0]

DTM quality level: [dropdown] Assigned device type (DTM) exactly matches the hardware information with all IDs and revision.

	Online device information	Suggested device type (DTM) information
Device:	TMT122	iTemp / TMT 122 / V1.1
Manufacturer:	Endress+Hauser	Endress+Hauser
Device type code (Cmd 0 Byte 2) / Sub Id	201	201/DDCEHS_H11c90201.DDDataModel
Manufacturer ID (Cmd 0 Byte 1)	17	17
Hardware revision / Signaling (Cmd 0 Byte 7)	1/0	
Software revision (Cmd 0 Byte 6)	11	2
Command revision (Cmd 0 Byte 5)	2	2
Profile revision (Cmd 0 Byte 4)	5	
Is generic:		No
Used Protocol	HART	HART
Device ID (Cmd 0 Bytes 9-11)	9307129	
Bus address	0	

Print required device type info | Assign device type (DTM)

Help | Details << | **OK** | Cancel

- Scanned devices on slot 04:

Verify Network - Scanning result

Warning: Automatic DTM identification for one or more devices failed. Please check the help for information concerning the assignment of devices.

Channel: Address	Status	Offline/Device Tag	DTM Quality	Device type (DTM)	Class (DTM)	Action
[Ch1.0]	New device found	-/HART0009	1	Deltabar S / xMD 7x / HART / FW 2.20.zz / Dev.Rev. 22	Pressure	Add to project
[Ch2.0]	New device found	-/HART0007	1	Levelllex / FMP 5x / HART / FW 1.02.zz / Dev.Rev. 3	Level	Add to project
[Ch3.0]	New device found	-/HART0008	1	Microplot / FMR5x / HART / FW 1.01.zz / Dev.Rev. 2	Level	Add to project
[Ch4.0]	New device found	-/HART0011	1	Prowil 200 / 7x2B / HART / FW 1.02.zz / Dev.Rev. 3	Flow	Add to project

DTM assignment details | Status and action details |

DTM assignment details for device at [Ch1.0]

DTM quality level: Assigned device type (DTM) exactly matches the hardware information with all IDs and revision.

	Online device information	Suggested device type (DTM) information
Device:	Deltabar S	Deltabar S / xMD 7x / HART / FW 2.20.zz / Dev.Rev. 22
Manufacturer:	Endress+Hauser	Endress+Hauser
Device type code (Cmd 0 Byte 2) / Sub Id	23	23/DDC11_17_1602.DDDataModel
Manufacturer ID (Cmd 0 Byte 1)	17	17
Hardware revision / Signaling (Cmd 0 Byte 7)	10/0	
Software revision (Cmd 0 Byte 6)	60	22
Command revision (Cmd 0 Byte 5)	22	22
Profile revision (Cmd 0 Byte 4)	7	
Is generic:		No
Used Protocol	HART	HART
Device ID (Cmd 0 Bytes 9-11)	9223846	
Bus address	0	

Print required device type info | Assign device type (DTM)

Help | Details << | **OK** | Cancel

- Scanned devices on slot 09:

Verify Network - Scanning result

Warning: Automatic DTM identification for one or more devices failed. Please check the help for information concerning the assignment of devices.

Channel: Address	Status	Offline/Device Tag	DTM Quality	Device type (DTM)	Class (DTM)	Action
[Ch1.0]	New device found	-/-----	1	Promag / 10 / V1.03.00	Flow	Add to project

DTM assignment details | Status and action details |

DTM assignment details for device at [Ch1.0]

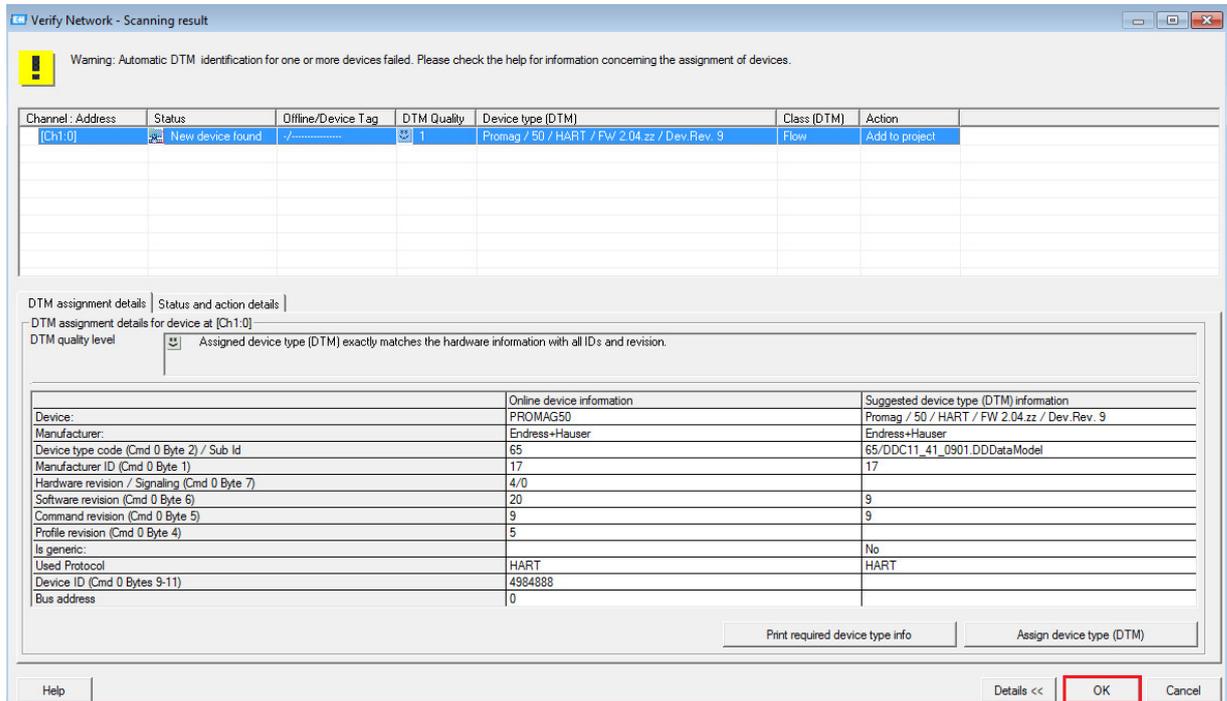
DTM quality level: Assigned device type (DTM) exactly matches the hardware information with all IDs and revision.

	Online device information	Suggested device type (DTM) information
Device:	PROMAG10	Promag / 10 / V1.03.00
Manufacturer:	Endress+Hauser	Endress+Hauser
Device type code (Cmd 0 Byte 2) / Sub Id	69	69/DDC11_45_0401.DDDataModel
Manufacturer ID (Cmd 0 Byte 1)	17	17
Hardware revision / Signaling (Cmd 0 Byte 7)	0/1	
Software revision (Cmd 0 Byte 6)	1	4
Command revision (Cmd 0 Byte 5)	4	4
Profile revision (Cmd 0 Byte 4)	5	
Is generic:		No
Used Protocol	HART	HART
Device ID (Cmd 0 Bytes 9-11)	4984847	
Bus address	0	

Print required device type info | Assign device type (DTM)

Help | Details << | **OK** | Cancel

- Scanned devices on slot 10:



Warning: Automatic DTM identification for one or more devices failed. Please check the help for information concerning the assignment of devices.

Channel : Address	Status	Offline/Device Tag	DTM Quality	Device type (DTM)	Class (DTM)	Action
[Ch1:0]	New device found	/.....	1	Promag / 50 / HART / FW 2.04.zz / Dev.Rev. 9	Flow	Add to project

DTM assignment details | Status and action details |

DTM assignment details for device at [Ch1:0]

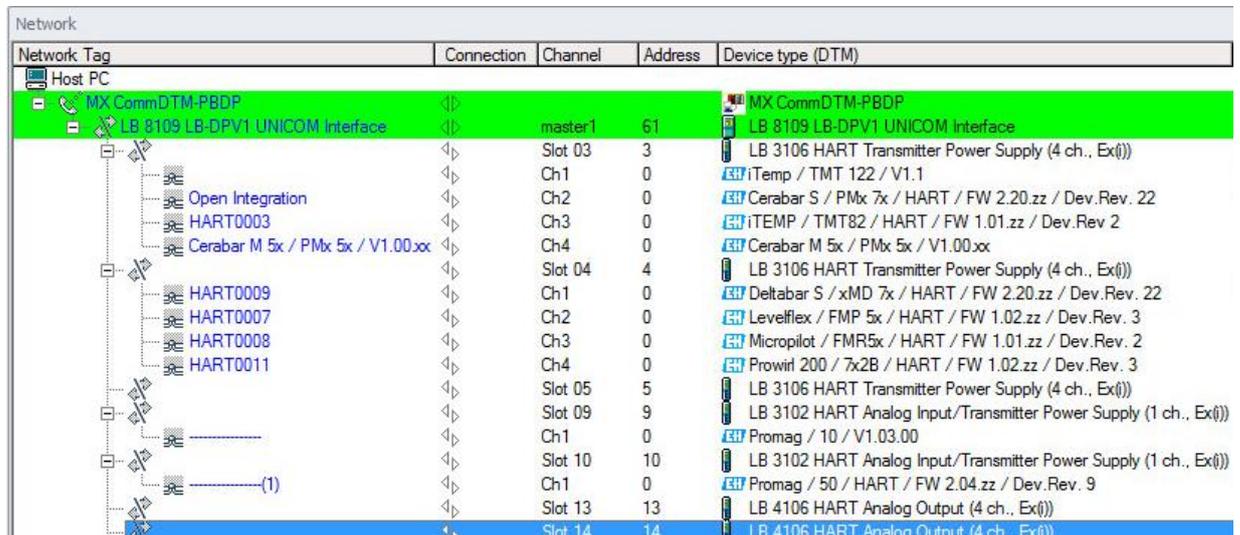
DTM quality level:

	Online device information	Suggested device type (DTM) information
Device:	PROMAG50	Promag / 50 / HART / FW 2.04.zz / Dev.Rev. 9
Manufacturer:	Endress+Hauser	Endress+Hauser
Device type code (Cmd 0 Byte 2) / Sub Id	65	65/DDC11_41_0901.DDDataModel
Manufacturer ID (Cmd 0 Byte 1)	17	17
Hardware revision / Signaling (Cmd 0 Byte 7)	4/0	
Software revision (Cmd 0 Byte 6)	20	9
Command revision (Cmd 0 Byte 5)	9	9
Profile revision (Cmd 0 Byte 4)	5	
Is generic:		No
Used Protocol	HART	HART
Device ID (Cmd 0 Bytes 9-11)	4984888	
Bus address	0	

Print required device type info | Assign device type (DTM)

Help | Details << | **OK** | Cancel

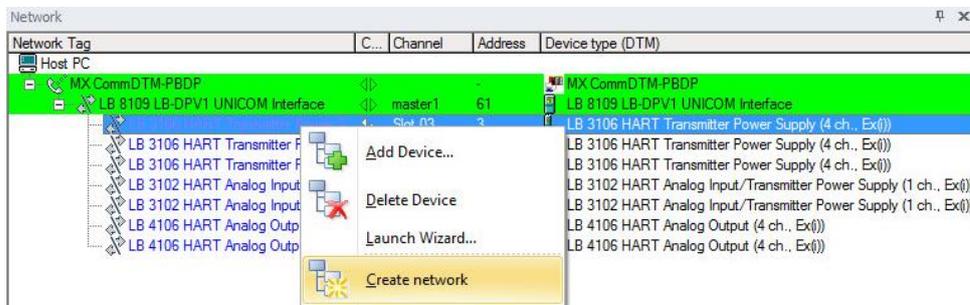
- When the scan is finished:



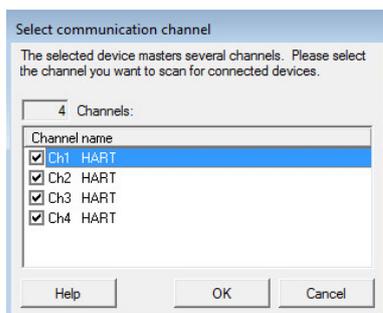
Network Tag	Connection	Channel	Address	Device type (DTM)
Host PC				
MX CommDTM-PBDP				MX CommDTM-PBDP
LB 8109 LB-DPV1 UNICOM Interface		master1	61	LB 8109 LB-DPV1 UNICOM Interface
Slot 03		3		LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
Ch1		0		iTemp / TMT 122 / V1.1
Ch2		0		Cerabar S / PMx 7x / HART / FW 2.20.zz / Dev.Rev. 22
Ch3		0		iTEMP / TMT82 / HART / FW 1.01.zz / Dev.Rev 2
Ch4		0		Cerabar M 5x / PMx 5x / V1.00.xx
Slot 04		4		LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
Ch1		0		Deltabar S / xMD 7x / HART / FW 2.20.zz / Dev.Rev. 22
Ch2		0		Levellflex / FMP 5x / HART / FW 1.02.zz / Dev.Rev. 3
Ch3		0		Micropilot / FMR5x / HART / FW 1.01.zz / Dev.Rev. 2
Ch4		0		Prowirl 200 / 7x2B / HART / FW 1.02.zz / Dev.Rev. 3
Slot 05		5		LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
Slot 09		9		LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
Ch1		0		Promag / 10 / V1.03.00
Slot 10		10		LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
Ch1		0		Promag / 50 / HART / FW 2.04.zz / Dev.Rev. 9
Slot 13		13		LB 4106 HART Analog Output (4 ch., Ex(i))
Slot 14		14		LB 4106 HART Analog Output (4 ch., Ex(i))

5.3.2.3 Single Card DeviceDTMs Scanning using the Function "Create Network"

- Select the cards on which devices are connected and execute the function "Create Network". In this example, the card LB3106 in Slot3 is scanned.



- Select the channels of the card that need to be scanned. In this example, the 4 channels are selected:



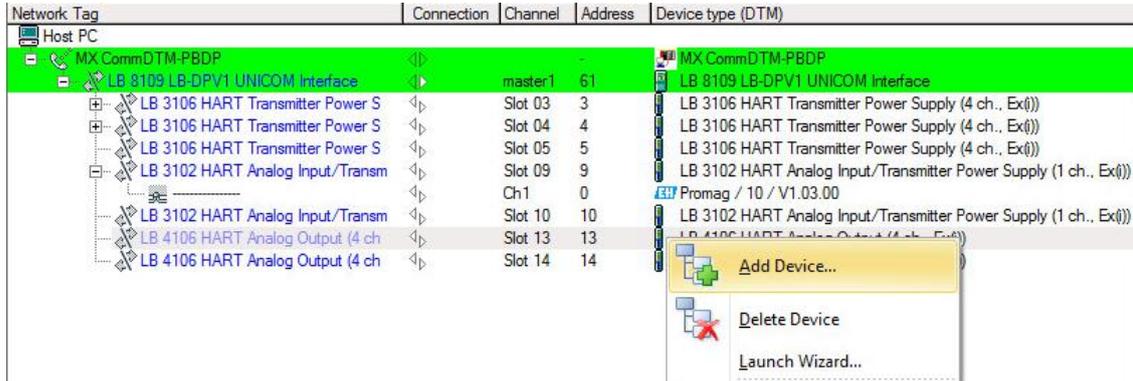
- DeviceDTMs of the corresponding scanned devices are automatically added in the project:

Network Tag	Connection	Channel	Address	Device type (DTM)
Host PC				
MX CommDTM-PBDP				MX CommDTM-PBDP
LB 8109 LB-DPV1 UNICOM Interface	↔	master1	61	LB 8109 LB-DPV1 UNICOM Interface
LB 3106 HART Transmitter Power S	↔	Slot 03	3	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
HART0006	↔	Ch1	0	ET iTEMP / TMT 122 / V1.1
HART0002	↔	Ch2	0	ET Cerabar S / PMx 7x / HART / FW 2.20.zz / Dev.Rev. 22
HART0003(1)	↔	Ch3	0	ET iTEMP / TMT82 / HART / FW 1.01.zz / Dev.Rev 2
HART0001	↔	Ch4	0	ET Cerabar M 5x / PMx 5x / V1.00.xx

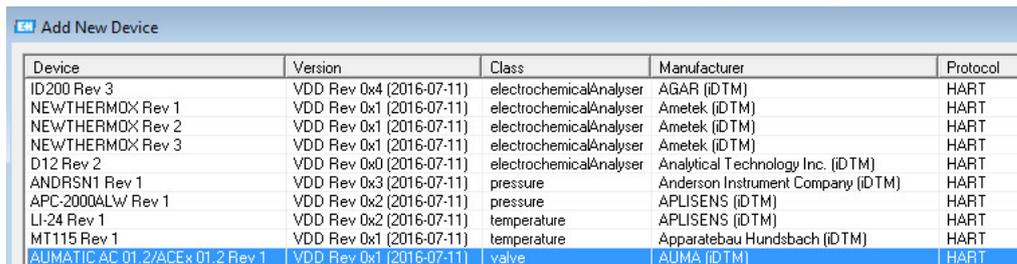
5.4 AUMA Actuator deviceDTM Configuration

The deviceDTM "AUMATIC AC01.2/ACEx 01.2 Rev1" must be added manually in the project.

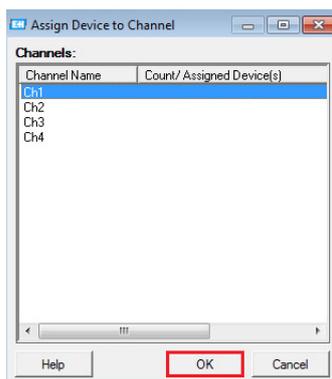
- Right-click on the DTM "LB4106 HART Analog Oupput" and select the menu "Add Device".



- Select the deviceDTM "AUMATIC AC01.2/ACEx 01.2 Rev1".



- Assign the channel on which the actuator is connected, channel 1 in this example and click on the button "OK":



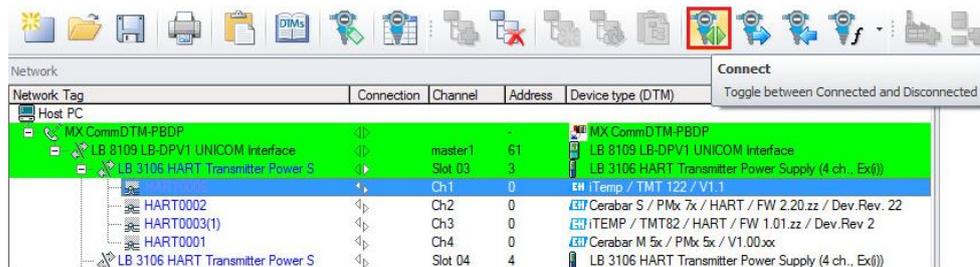
- The deviceDTM "AUMATIC AC01.2/ACEx 01.2 Rev1" is successfully inserted:



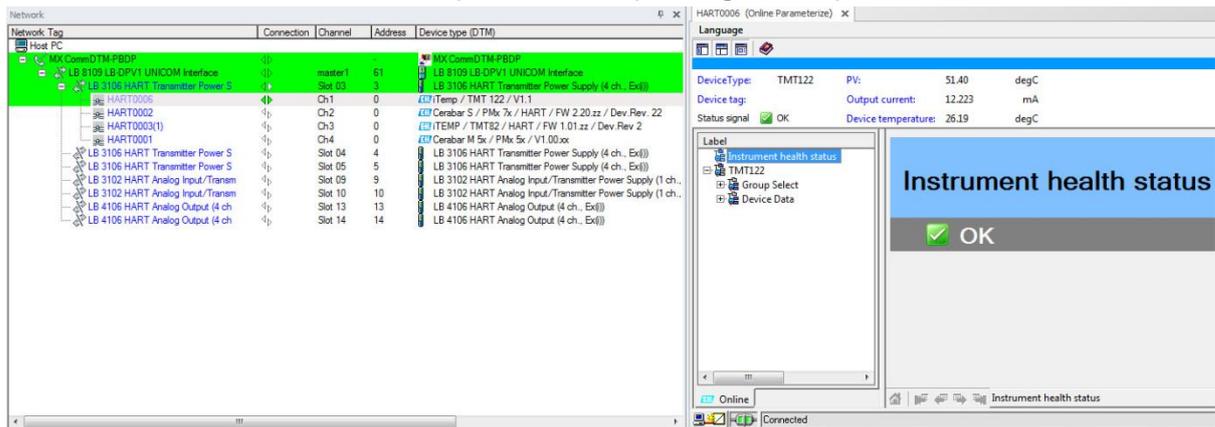
5.5 DeviceDTM Online Connection

5.5.1 Endress+Hauser iTEMP TMT122 Online Connection

- Devices can now be connected. Select for example the deviceDTM “iTEMP / TMT122 /V1.1” and click on the shortcut button “Connect”.

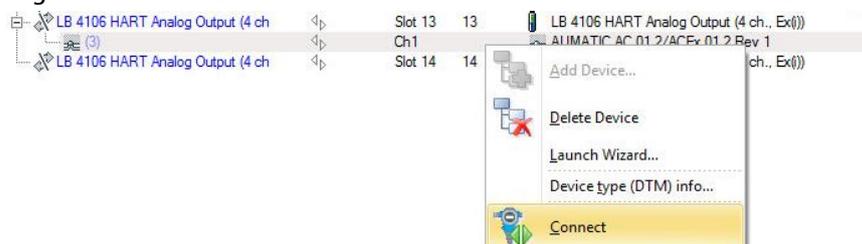


- Double-click on this deviceDTM to open the corresponding Online parameters.

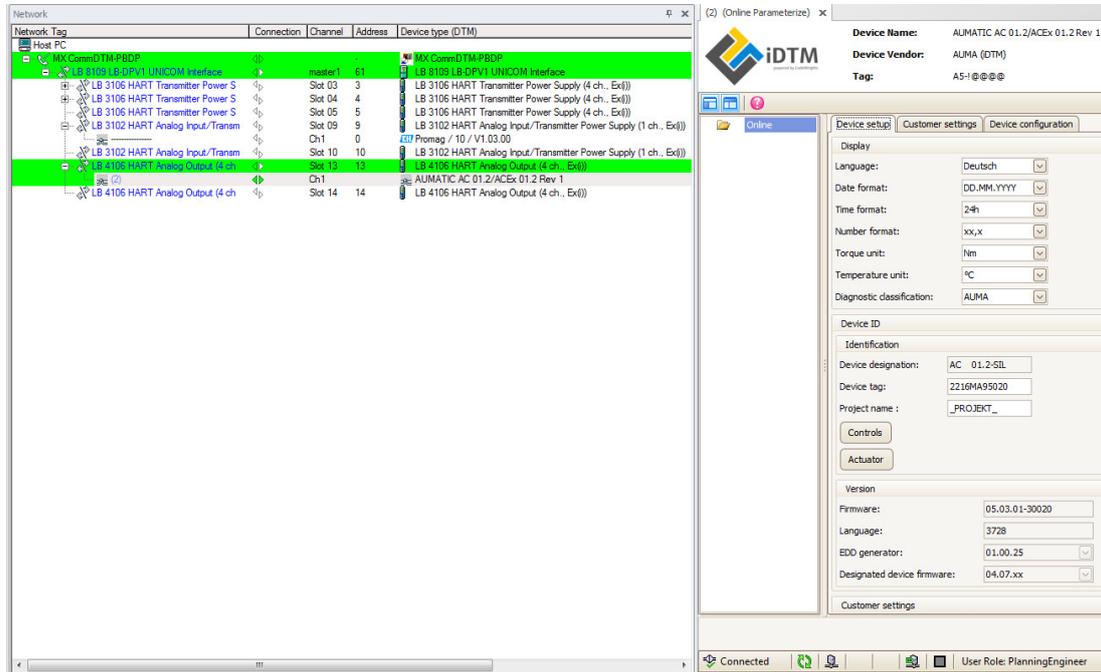


5.5.2 AUMA Actuator Online Connection

- Right-click on the deviceDTM “AUMATIC AC01.2/ACEx 01.2 Rev1” and select the menu “Connect”.

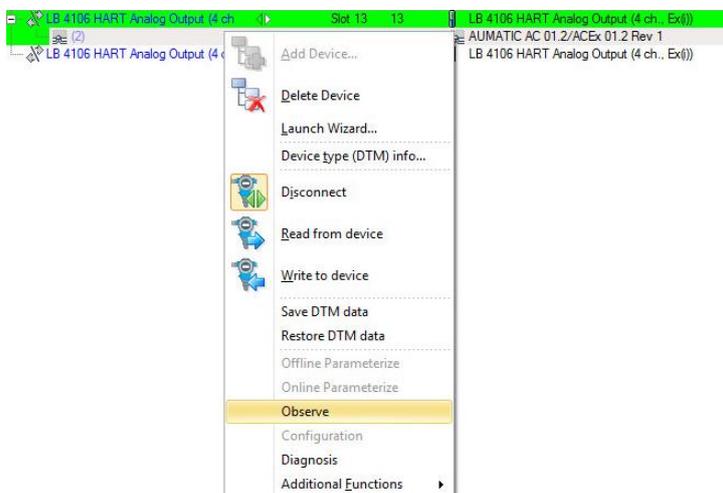


- Double-click on this deviceDTM to open the corresponding Online parameters.



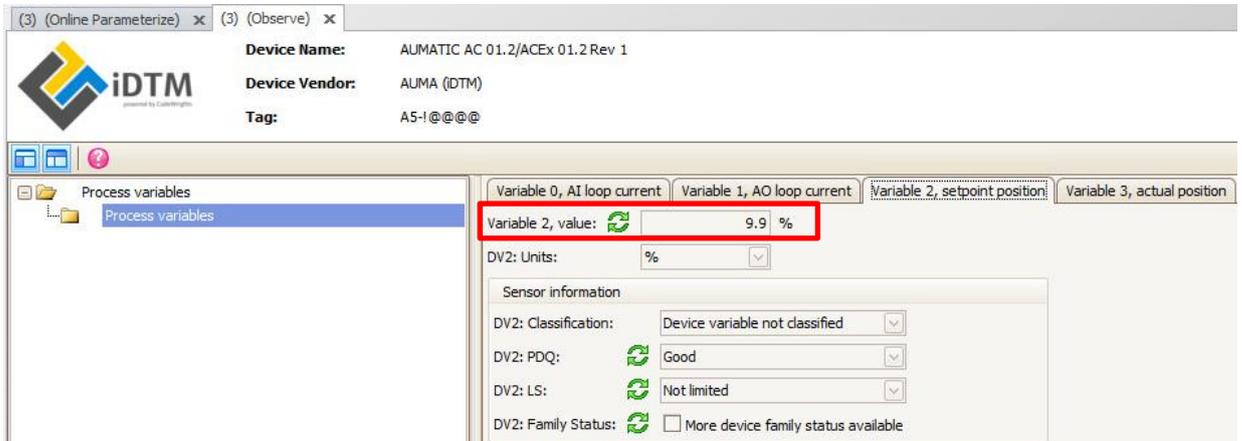
The screenshot shows the iDTM software interface. On the left, a network tree displays a hierarchy of devices. The 'AUMATIC AC 01.2/ACEx 01.2 Rev 1' device is highlighted in green. On the right, the 'Online Parameterize' window is open, showing the configuration for this device. The 'Device Name' is 'AUMATIC AC 01.2/ACEx 01.2 Rev 1', the 'Device Vendor' is 'AUMA (DTM)', and the 'Tag' is 'A5-I@@@'. The 'Online' tab is active, showing various settings such as Language (Deutsch), Date format (DD.MM.YYYY), Time format (24h), Number format (xx,x), Torque unit (Nm), Temperature unit (°C), and Diagnostic classification (AUMA). The 'Device ID' section shows 'AC 01.2-SIL' for the device designation, '2216MA95020' for the device tag, and 'PROJECT_' for the project name. The 'Version' section shows '05.03.01-30020' for the firmware, '3728' for the language, '01.00.25' for the EDO generator, and '04.07.xx' for the designated device firmware. The 'Customer settings' section is also visible at the bottom.

- Right-click on the AUMA deviceDTM and select the option "Observe" to display the process variables.



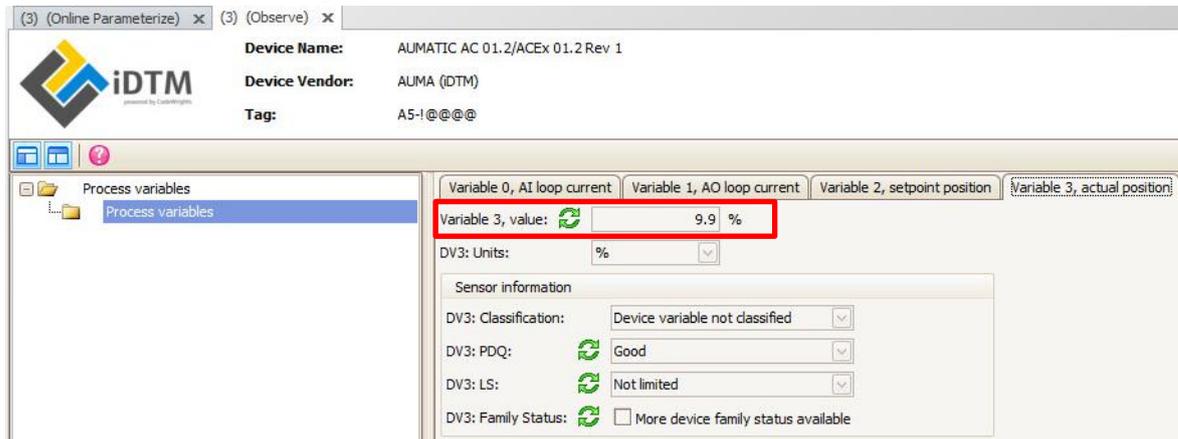
The screenshot shows a context menu for the AUMA deviceDTM. The menu items are: Add Device..., Delete Device, Launch Wizard..., Device type (DTM) info..., Disconnect, Read from device, Write to device, Save DTM data, Restore DTM data, Offline Parameterize, Online Parameterize, Observe (highlighted in yellow), Configuration, Diagnosis, and Additional Functions. The 'Observe' option is selected, indicating that the user wants to display the process variables for the device.

- Value of the configured set point done in chapter 3.5.2.2:



The screenshot shows the IDTM software interface. At the top, it displays the device name 'AUMATIC AC 01.2/ACEX 01.2 Rev 1', device vendor 'AUMA (IDTM)', and tag 'A5-1@@@@'. Below this, a tree view on the left shows 'Process variables' expanded. The main panel displays four variables: 'Variable 0, AI loop current', 'Variable 1, AO loop current', 'Variable 2, setpoint position', and 'Variable 3, actual position'. The 'Variable 2, setpoint position' is selected, and its value is shown as '9.9 %' in a red box. Below the value, the units are set to '%'. A 'Sensor information' section shows 'DV2: Classification' as 'Device variable not classified', 'DV2: PDQ' as 'Good', 'DV2: LS' as 'Not limited', and 'DV2: Family Status' as 'More device family status available'.

- Value of the corresponding feedback:



The screenshot shows the IDTM software interface, similar to the previous one. It displays the same device information. The tree view on the left shows 'Process variables' expanded. The main panel displays the same four variables. The 'Variable 3, actual position' is selected, and its value is shown as '9.9 %' in a red box. Below the value, the units are set to '%'. A 'Sensor information' section shows 'DV3: Classification' as 'Device variable not classified', 'DV3: PDQ' as 'Good', 'DV3: LS' as 'Not limited', and 'DV3: Family Status' as 'More device family status available'.

Remark:

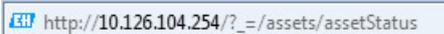
Set point position and actual position values are identical as these one received via HART Command3 in chapter 4.3.4.

6 Bypassed Tool Integration

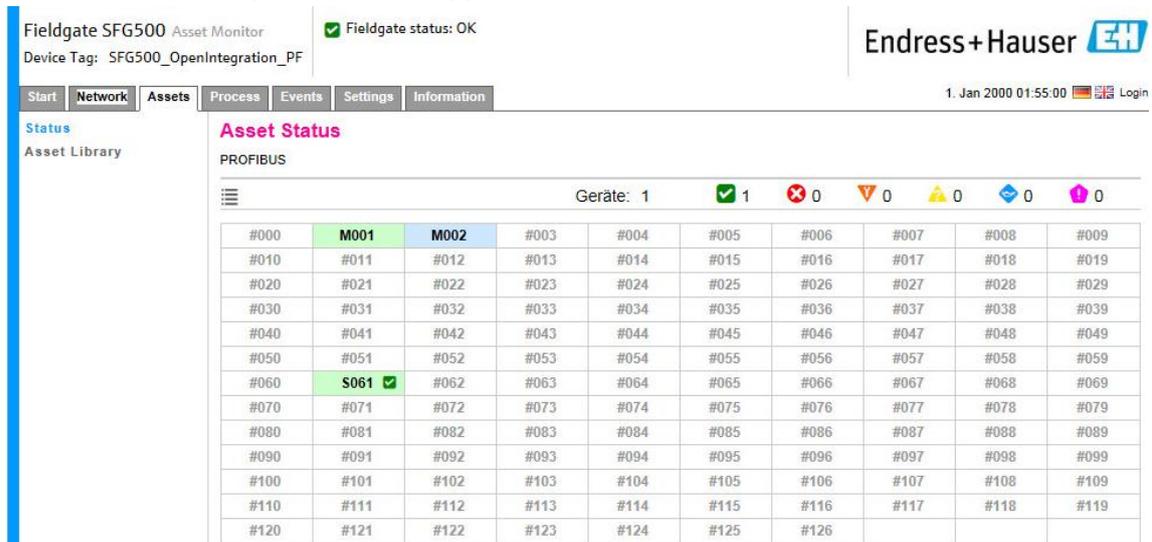
This chapter describes the alternative workflow for commissioning of the Endress+Hauser Plant Asset Management (PAM system) with independent access path via Fieldgate SFG500. As a result, the Endress+Hauser PAM system can access underlying HART devices via PROFIBUS Pepperl+Fuchs Remote IO for device 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, 10.126.104.254 (specific for this example).

 `http://10.126.104.254/?_=/assets/assetStatus`

- The Fieldgate SFG500 main window is displayed. All detected devices (Masters and slaves) are displayed in this view. In this example:
 - M001 corresponds to the Mitsubishi PROFIBUS Master (PROFIBUS address 1).
 - M002 corresponds to the SFG500 (PROFIBUS address 2).
 - S061 corresponds to the Pepperl+Fuchs Com Unit (PROFIBUS address 61).



Fieldgate SFG500 Asset Monitor Fieldgate status: OK

Device Tag: SFG500_OpenIntegration_PF Endress+Hauser 

Start Network **Assets** Process Events Settings Information 1. Jan 2000 01:55:00  Login

Asset Status

PROFIBUS

Geräte: 1 ✔ 1 ✘ 0 ▽ 0 ⚠ 0 ◇ 0 ! 0

#000	M001	M002	#003	#004	#005	#006	#007	#008	#009
#010	#011	#012	#013	#014	#015	#016	#017	#018	#019
#020	#021	#022	#023	#024	#025	#026	#027	#028	#029
#030	#031	#032	#033	#034	#035	#036	#037	#038	#039
#040	#041	#042	#043	#044	#045	#046	#047	#048	#049
#050	#051	#052	#053	#054	#055	#056	#057	#058	#059
#060	S061 ✔	#062	#063	#064	#065	#066	#067	#068	#069
#070	#071	#072	#073	#074	#075	#076	#077	#078	#079
#080	#081	#082	#083	#084	#085	#086	#087	#088	#089
#090	#091	#092	#093	#094	#095	#096	#097	#098	#099
#100	#101	#102	#103	#104	#105	#106	#107	#108	#109
#110	#111	#112	#113	#114	#115	#116	#117	#118	#119
#120	#121	#122	#123	#124	#125	#126			

- Click on the shortcut button "Show List View" for more details:



Asset Status

PROFIBUS

Show List View **M001**

- In this example the ComUnit with PROFIBUS address 61 is in cyclic data exchange mode with the Mitsubishi PROFIBUS Master M001.

Fieldgate SFG500 Asset Monitor ✔ Fieldgate status: OK

Device Tag: SFG500_OpenIntegration_PF

Endress+Hauser 

1. Jan 2000 02:08:50  Login

Start
Network
Assets
Process
Events
Settings
Information

Status

Asset Library

Asset Status

PROFIBUS

Geräte: 1
✔ 1
✘ 0
▽ 0
⚠ 0
🔗 0
👤 0

Slave	NE107	Tag	Device Type	Vendor	Ident
S061	✔		LB/FB 8x05H/DPV1 V6	PEPPERL+FUCHS G...	0x1710

Details of Slave: [S061] LB/FB 8x05H/DPV1 V6

✔ **Device Status: OK**
00 04 00 01 17 10 07 80 00 00 04 00 00

In cyclic data exchange with Master M001
[details..](#)

SD01766S/04/EN/01.16

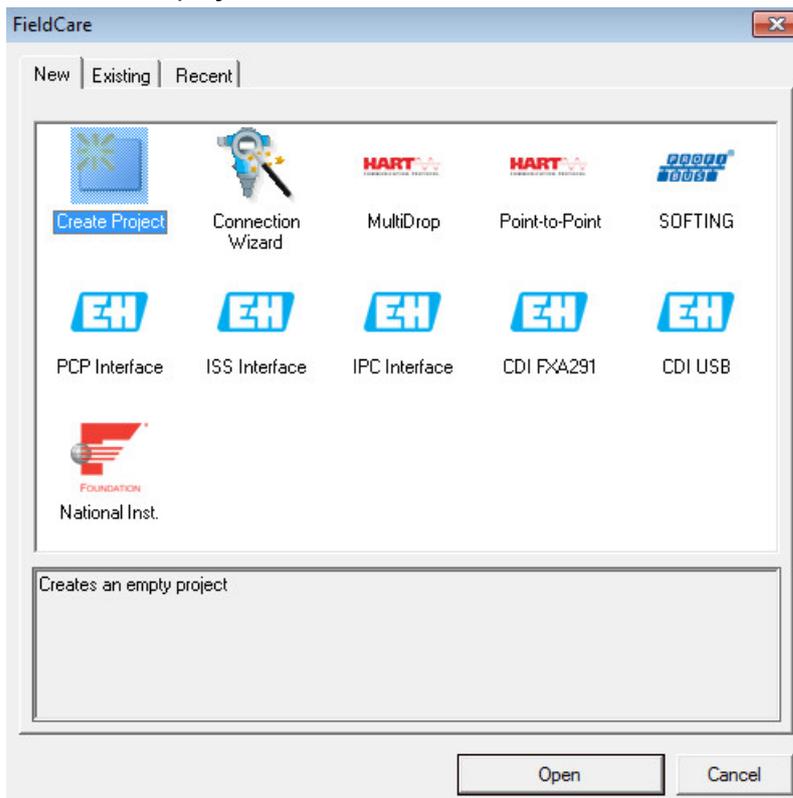
121/132

6.2 Endress+Hauser DTM SFG500 Configuration

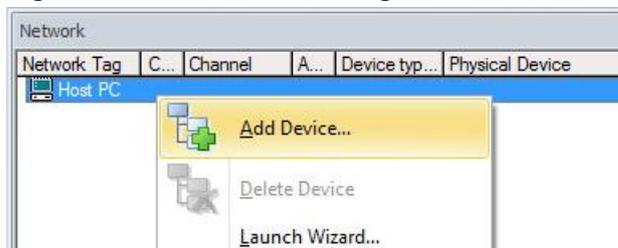
- Start the application FieldCare.



- Create a new project.



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



- Add the device "SFGNetwork".

PCP (Readwin) TXU10/FXA291	V1.01.18 (2014-02-21)	-	Endress+Hauser	PCP
PROFIdm DPV1	V 2.11(115) (2010-08-18)	-	Softing Industrial Automation GmbH	Profibus DP/V1
Servicebus interface LB/FB series	V1.0 (2006-07-01)	-	PEPPERL+FUCHS GmbH	P+F LB FB Servicebus
SFGNetwork	V1.09.00.328 (2016-03-24)	dtmSpecific	Endress+Hauser	SFG5xx

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



Network Tag	Connection	Channel	Address	Device type (DTM)	Physical Device
Host PC					
SFGNetwork				SFGNetwork	

6.3 Pepperl+Fuchs Remote IO System Configuration

6.3.1 LB8109 Settings

- Refer to chapter 5.2.1.2.

6.3.2 LB3106 HART Transmitter Settings

- Refer to chapter 5.2.2.

6.3.3 LB3102 HART Analog Input / Transmitter Settings

- Refer to chapter 5.2.3.

6.3.4 LB4106 HART Analog Output / Transmitter Settings

- Refer to chapter 5.2.4.

6.3.5 Configuration Download into the Com Unit LB8109

- Refer to chapter 5.2.5.

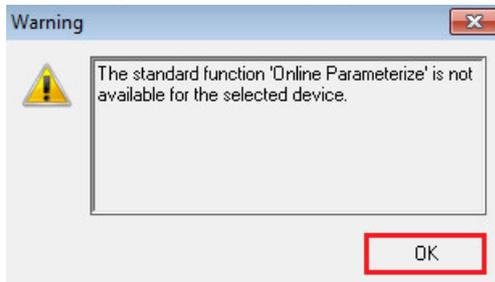
6.4 Project Network Scanning

6.4.1.1 Network Scanning with FieldCare Function "Create Network"

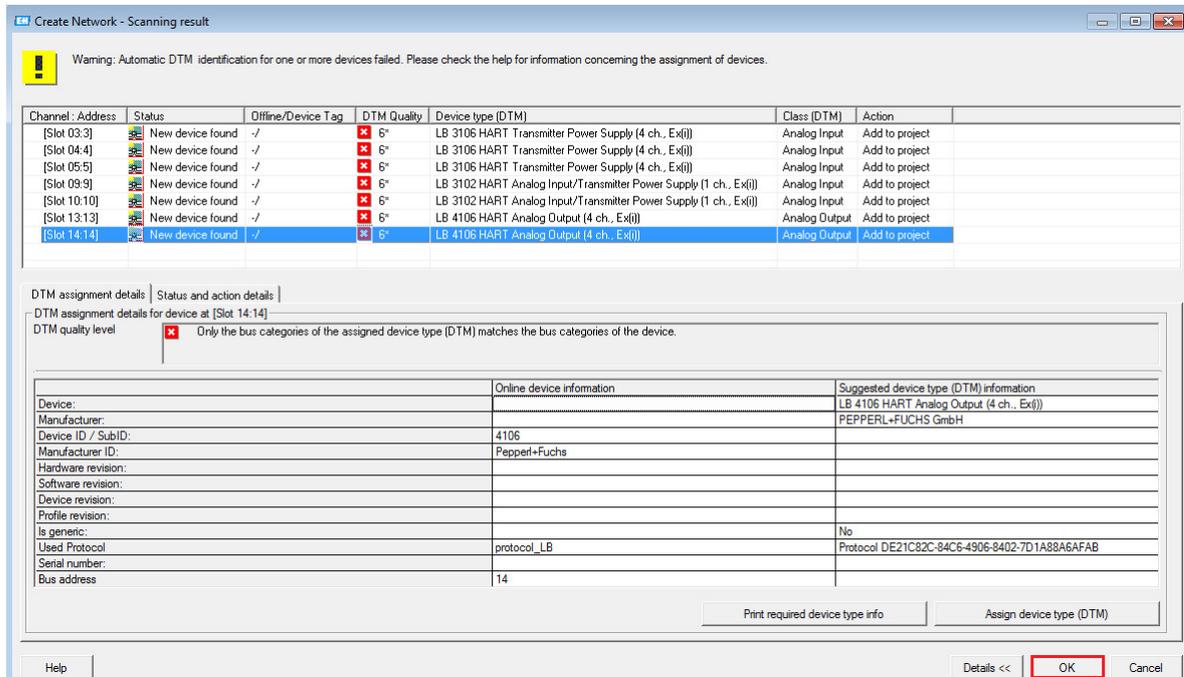
- Select the "SFGNetwork" and click on the shortcut button "Create Network".



- Following window is displayed. Click on the button "OK" to continue:



- Assign all deviceDTMs as done in chapter 5.3.1.



- Scan result:

Network Tag	Connection	Channel	Address	Device type (DTM)
Host PC				
SFGNetwork				SFGNetwork
SFG500				SFG500
LB 8109 LB-DPV1 UNICOM Interface		SFGNetwo... 9		LB 8109 LB-DPV1 UNICOM Interface
LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))		SFG500Ch... 61		LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
Open Integration		Slot 03	3	Temp / TMT 122 / V1.1
HART0003		Ch1	0	Cerabar S / PMx 7x / HART / FW 2.20.zz / Dev.Rev. 22
Cerabar M 5x / PMx 5x / V1.00.xx		Ch2	0	ITEMP / TMT82 / HART / FW 1.01.zz / Dev.Rev 2
LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))(1)		Ch3	0	Cerabar M 5x / PMx 5x / V1.00.xx
HART0009		Slot 04	4	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
HART0007		Ch1	0	Deltabar S / xMD 7x / HART / FW 2.20.zz / Dev.Rev. 22
HART0008		Ch2	0	Leveflex / FMP 5x / HART / FW 1.02.zz / Dev.Rev. 3
HART0011		Ch3	0	Microplot / FMR5x / HART / FW 1.01.zz / Dev.Rev. 2
LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))(2)		Ch4	0	Prowirl 200 / 7x2B / HART / FW 1.02.zz / Dev.Rev. 3
LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))		Slot 05	5	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))(1)		Slot 09	9	LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
(-1)		Ch1	0	Promag / 10 / V1.03.00
LB 4106 HART Analog Output (4 ch., Ex(i))		Slot 10	10	LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
		Ch1	0	Promag / 50 / HART / FW 2.04.zz / Dev.Rev. 9
		Slot 13	13	LB 4106 HART Analog Output (4 ch., Ex(i))
		Slot 14	14	LB 4106 HART Analog Output (4 ch., Ex(i))

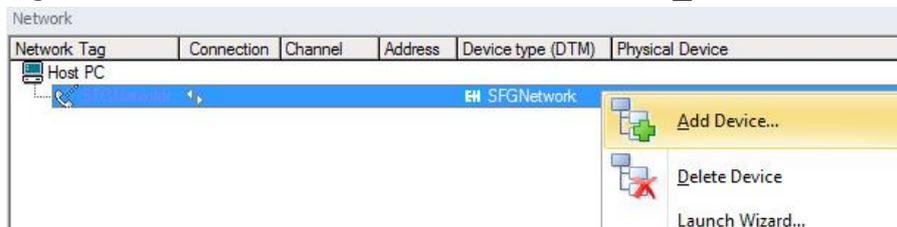
6.4.1.2 Network Scanning with LB8109 commDTM Function "Topology Scan"

Another option to scan the network is to use the function "Topology Scan" of the commDTM "LB 8109 LB-DPV1 UNICOM Interface" in combination with the FieldCare functions "Verify Network" or "Create Network" (the "Topology Scan" function only scans the Pepperl+Fuchs Hardware).

However, this requires at first the configuration of the SFG500 commDTM.

6.4.1.2.1 SFG500 commDTM configuration

- Right-click on the SFG Network and select the menu "Add Device...".



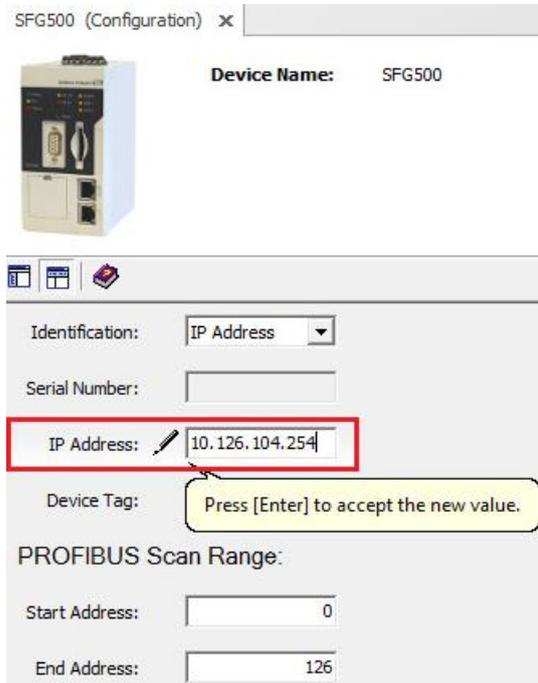
- Select the DTM "SFG500":

Device	Version	Class	Manufacturer	Protocol
SFG500	V1.09.00.328 [2016-03-24]	dtmSpecific	Endress+Hauser	SFG5xx

- Right-click on the menu "Configuration".

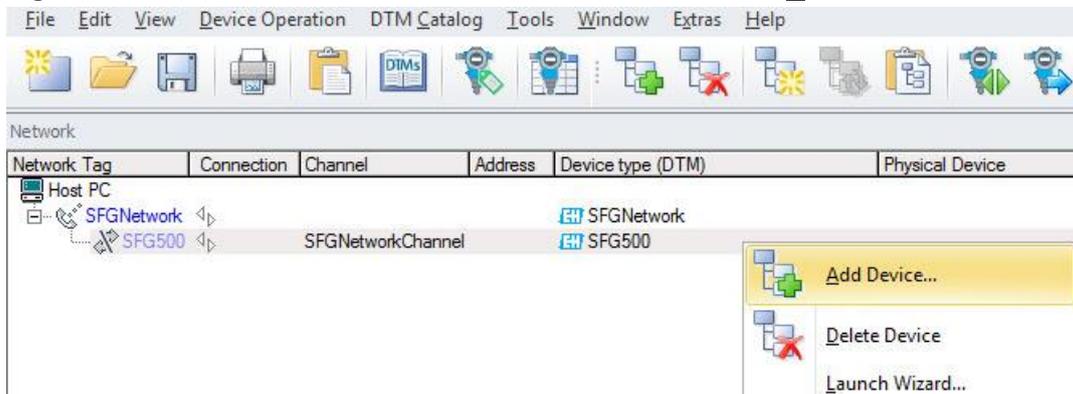


- Configure the SFG500 IP address and click on the Keyboard touch "Enter".



6.4.1.2.2 Com Unit LB8109 PROFIBUS Address

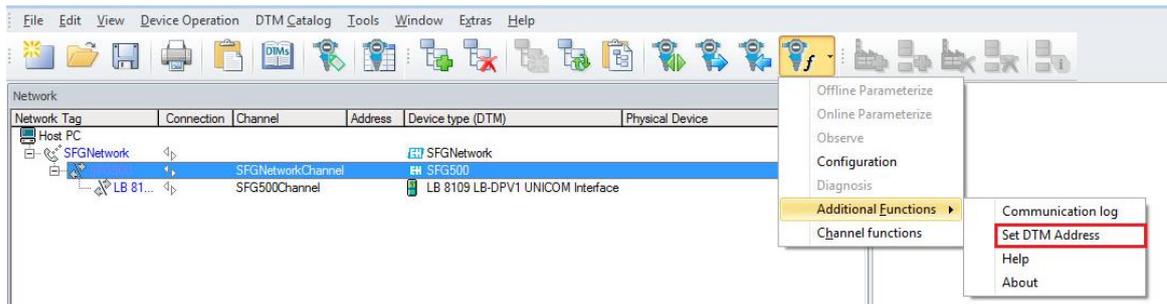
- Right-click on the "SFGNetworkChannel" and select the menu "Add Device..."



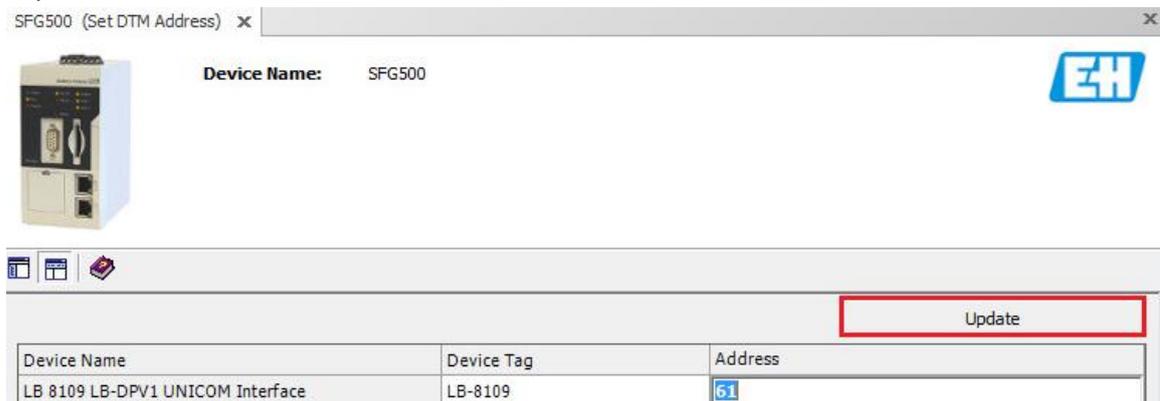
- Select the commDTM "LB 8109 LB-DPV1 UNICOM Interface".

FB 8205 FB-DPV1 Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
FB 8206 FB-EasyCom Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
FB 8209 FB-DPV1 UNICOM Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
LB 8105 LB-DPV1 Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
LB 8106 LB-EasyCom Communication Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus
LB 8109 LB-DPV1 UNICOM Interface	V1.4 (2007-03-30)	remoteIO	PEPPERL+FUCHS GmbH	PROFIBUS DP/V1, P+F LB FB Servicebus

- Select the commDTM "SFG500", then click on the button "Device Functions" and select the menu "Additional Functions→Set Device Address"..



- Enter the PROFIBUS address, for example address 61 in this example and click on the button "Update".



- Com Unit LB8109 is now configured with PROFIBUS address 61.



Network Tag	Connection	Channel	Address	Device type (DTM)
Host PC				EH SFGNetwork
SFGNetwork				EH SFG500
LB 8109 LB-DPV1 UNICOM Interface	SFGNetworkChannel	SFG500Channel	61	LB 8109 LB-DPV1 UNICOM Interface

6.4.1.2.3 Topology Scan

- Refer to chapter 5.3.2.1 for using the function “Topology Scan”.
- Topology scan result:

Network			
Network Tag	C...	Channel	A... Device type (DTM)
Host PC			
SFGNetwork			SFGNetwork
SFG500		SFGNetworkChannel 9	SFG500
LB 8109 LB-DP...		SFG500Channel 61	LB 8109 LB-DPV1 UNICOM Interface
LB 3106 H...		Slot 03	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
LB 3106 H...		Slot 04	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
LB 3106 H...		Slot 05	LB 3106 HART Transmitter Power Supply (4 ch., Ex(i))
LB 3102 H...		Slot 09	LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
LB 3102 H...		Slot 10	LB 3102 HART Analog Input/Transmitter Power Supply (1 ch., Ex(i))
LB 4106 H...		Slot 13	LB 4106 HART Analog Output (4 ch., Ex(i))
LB 4106 H...		Slot 14	LB 4106 HART Analog Output (4 ch., Ex(i))

6.4.1.2.4 DeviceDTMs Scanning using the FieldCare Function “Verify Network”

- Refer to chapter 5.3.2.2.

6.4.1.2.5 Single Card DeviceDTMs Scanning using the Function “Create Network”

- Refer to chapter 5.3.2.3.

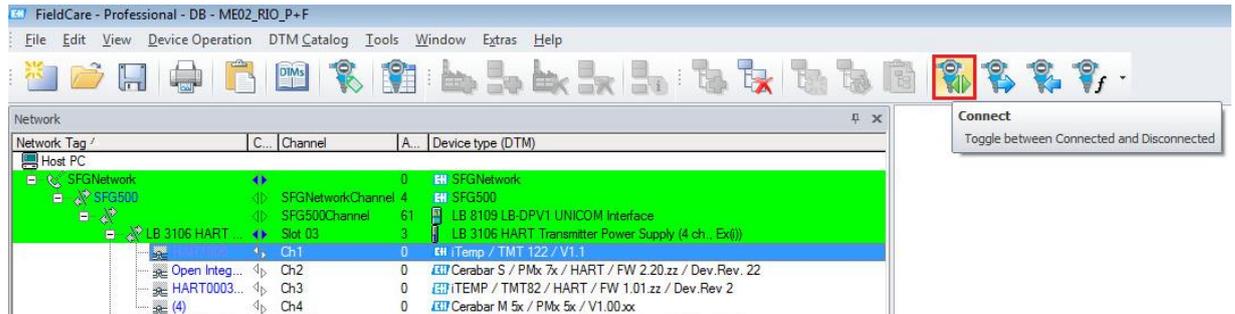
6.5 AUMA Actuator deviceDTM Configuration

- Refer to chapter 5.4.

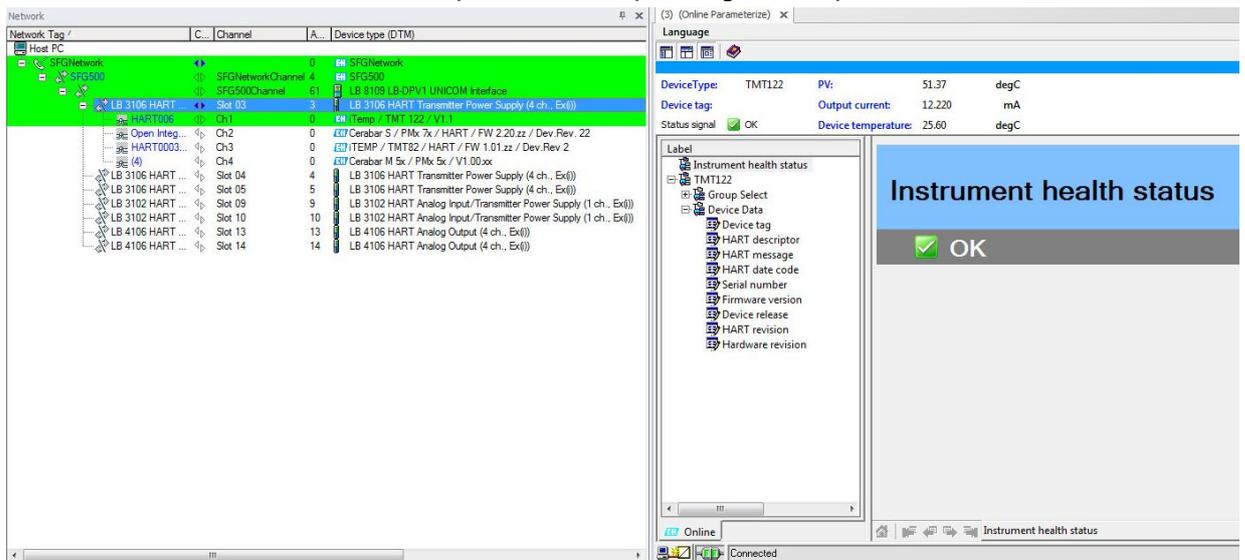
6.6 DeviceDTM Online Connection

6.6.1 Endress+Hauser iTEMP TMT122 Online Connection

- Devices can now be connected. Select for example the deviceDTM “iTEMP / TMT122 /V1.1” and click on the shortcut button “Connect”.

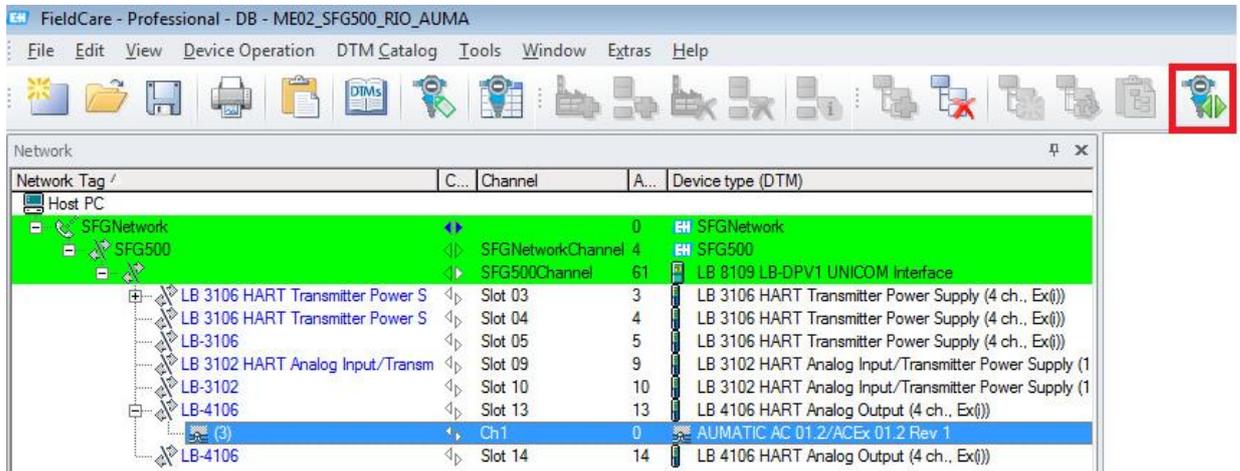


- Double-click on this deviceDTM to open the corresponding Online parameters.

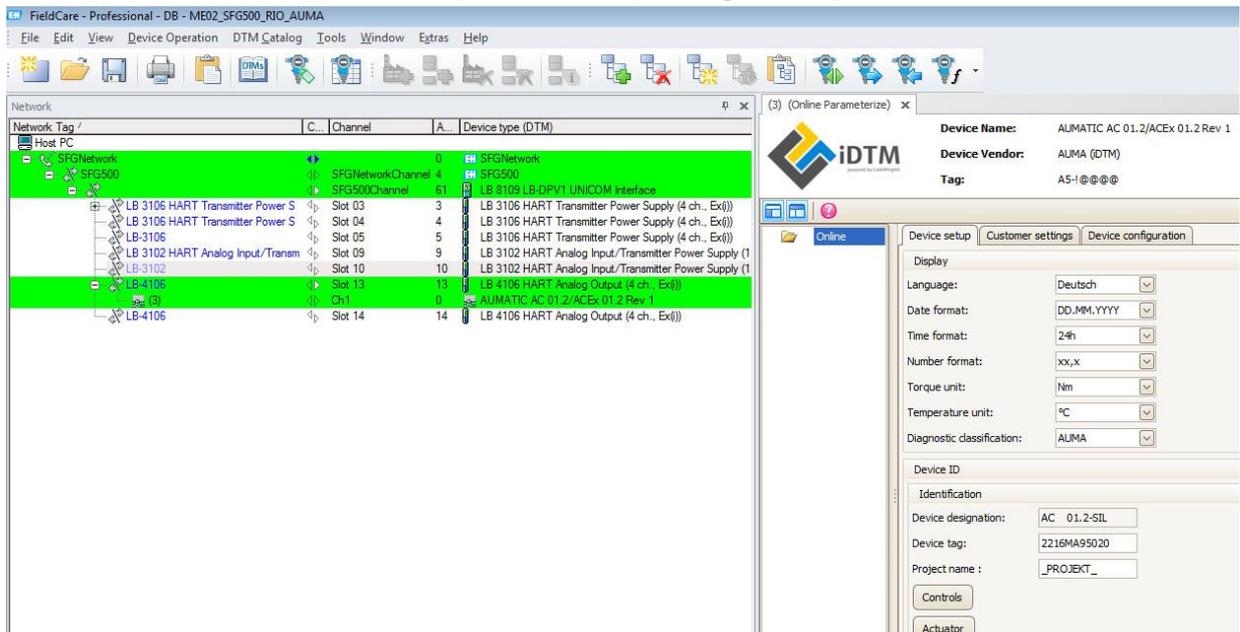


6.6.2 AUMA Actuator Online Connection

- Select for example the deviceDTM “AUMATIC AC01.2/ACEx 01.2 Rev1” and click on the shortcut button “Connect”.



- Double-click on this deviceDTM to open the corresponding Online parameters.



- Refer to chapter 5.5.2 for more Online windows.

www.endress.com/open-integration
