



People for Process Automation

Version 1.00.00

Integration Tutorial SE02

Schneider Electric Modicon M580 and HART for Water & Wastewater Industry







Integration Tutorial SE02

Version 1.00.00

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Endress+Hauser

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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 with the Schneider Electric Modicon M580 system. All content of this document is jointly developed, reviewed and approved by Schneider Electric and Endress+Hauser as a common deliverable of Open Integration.

1.2 Document History

This is version 1.00.00 of this document. Version history:

Version	Released	Description
1.00.00	2017-10	Initial version

1.3 Related Documents

Please refer to related documents as listed below:

Document	Description
SD01936S/04/EN/01.17	Reference Topology SE02
SD01938S/04/EN/01.17	Integration Test Summary SE02
SD01939S/04/EN/01.17	List of Tested Devices and Versions SE02





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2 Pre-Requisites

Readers of this document should be familiar with related documents as listed in chapter 1.3 and basics on how to work with the Schneider Electric Modicon M580 System and HART in general. Please refer to recommended literature as listed in chapter 2.1.

2.1 Recommended Literature

2.1.1 Schneider Electric

Document	Description
EIO000001854.02	Modicon M580 Remote I/O Modules (Hardware)
35006238.13	Modicon M580 and Premium/Atrium using Unity Pro
EAV16400.01	Modicon eX80 BME AHI 0812 HART Analog Input Module & BME AHO 0412 HART Analog Output Module User Guide

2.1.2 Endress+Hauser

Document	Description
BA00065S	FieldCare Project Tutorial

2.2 Operable Control System

This document assumes an operable Schneider Electric Modicon M580 System as defined by Reference Topology SE02. Please refer to the manuals listed in chapter 2.1.1 for an explanation on how to use hard-and software provided by Schneider Electric.

2.3 Operable Asset Management System

This document assumes an operable Endress+Hauser PAM System as defined by Reference Topology SE02. Please refer to manuals listed in chapter 2.1.2 for installing of software provided by Endress+Hauser.

2.4 Operable Field Devices

This document assumes an operable selection of Endress+Hauser HART devices, as defined by Reference Topology SE02. Each field device is powered if needed and adequately connected to the Schneider Electric M580 System. If required, please refer to individual device manuals for further advice.





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3 Basic Integration

This chapter describes the main workflow for integration of HART devices into the Schneider Electric M580 System by means of Universal Commands. As a result, the 4-20 mA/HART communication is running. HART process values and status information is available within the control strategy of the system for further processing.

3.1 System Configuration

3.1.1 New Project

• Start the software Unity Pro XL:



• Create a new project with the menu "File \rightarrow <u>N</u>ew...":

🛞 Unity Pro	XL			
File View	Tools	PLC	Help	
睝 <u>N</u> ew				Ctrl+N
🔁 <u>O</u> pen				Ctrl+0
<u>E</u> xit				

• Select the PLC and Rack type. Click on the button "OK". In this example, the PLC BMEP582040 is mounted on a Rack BMEXBP0400:

PLC	Min.OS Version	Description	Cancel
Modicon M340	1		
Modicon M580			Help
BME H58 2040	02.20	CPU 580-2 ETH HSBY remote and distributed IO	
BME H58 4040	02.20	CPU 580-4 ETH HSBY remote and distributed IO	
BME H58 6040	02.20	CPU 580-6 ETH HSBY remote and distributed IO	
BME P58 1020	02.20	CPU 580-1 ETH distributed IO	
BME P58 2020	02.20	CPU 580-2 ETH distributed IO	
BME P58 2040	02.20	CPU 580-2 ETH remote and distributed IO	
BME P58 3020	02.20	CPU 580-3 ETH distributed IO	
BME P58 3040	02.20	CPU 580-3 ETH remote and distributed IO	
BME P58 4020	02.20	CPU 580-4 ETH distributed IO	
BME P58 4040	02.20	CPU 580-4 ETH remote and distributed IO	
BME P58 5040	02.20	CPU 580-5 ETH remote and distributed IO	
BME P58 6040	02.20	CPU 580-6 ETH remote and distributed IO	
Momentum Unity			
Premium			
Outpetum			
Podorkum Pack	Description.	·	
ack - Modern M580 local drep	Description		
Rack ☐ Modicon M590 local drop ☐ Rack	Description		
Rack Modercon M590 local drop Rack Rack Rack Rack Rack Rack Rack Rack Rack Rack	Description		
ack → Modicon M580 local drop → Rack ■ MME X8P 0400 ■ BME X8P 0400 ■ BME X8P 0602 ■ BME X8P 0602	Description 4 SLO (S ETHER 6 SLOTS REDUK	NET BACKPLANE DANT ETHERNET BACKPLANE MET EACKPLANE	
Rack Modicon M580 local drop Rack Rack Rack BME XBP 0602 BME XBP 0800 BME XBP 0800 BME XBP 0800	Description 4 SLOTS ETHER 6 SLOTS REDUN 8 SLOTS FTHER 10 SLOTS FTHER	INET BACKPLANE DANT ETHERNET BACKPLANE INET BACKPLANE INET BACKPLANE	





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• Created Project structure:



3.1.2 Hardware Configuration

3.1.2.1 M580 PLC

• Double-click on the field "0: PLC bus" in the Project Browser view:



• The PLC module is inserted automatically with the power supply CPS4002:







• In our example, the used Power Supply is the CPS2010 module. Delete the current one by rightclicking on the symbol CPS2000 and select the menu "Delete Module":

K Cut	Ctrl+X
•••• 🖻 <u>С</u> ору	Ctrl+C
Paste	Ctrl+V
<u>D</u> elete Moo	lule Del
Open Mod	ule
Move Mod	ule

• The power supply module is now deleted:



• Double-click on the empty module and select the correct power supply module. In this case, it is the module BMXCPS2010. Click on the button "OK":

Topological Address:		0	Cancel
Part Number	Description		Help
Modicon M580 local drop			
Supply			
BMX CPS 2000	STANDARD AC POWER SUPPLY		
BMX CPS 2010	STANDARD ISOL DC POWER SUPPLY		
BMX CPS 3020	HIGH POWER ISOL 24 TO 48 VDC POWER SUPPLY		
BMX CPS 3500	HIGH POWER AC POWER SUPPLY		
BMX CPS 3540	HIGH POWER DC POWER SUPPLY		
BMX CPS 4002	REDUNDANT AC POWER SUPPLY (DOUBLE FORMAT)		

• M580 PLC rack:







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3.1.2.2 X80 Remote IO

3.1.2.2.1 EIO Adapter CRA31210

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

🗧 Struc	tural view				
	oject	1102			
ė6	, Configura	tion			
ė		bus			
Configuration 					
		(P) (P) : E	MX CPS 201	0	
	ė 🛉	0 (1) : BM	E P58 2040		
		I FIO			
	36	2			
	ret i	V -			
		V 2			

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



 Select the correct backplane and X80 EIO Adapter and click on the button "OK". In this example, the BMEXBP0400 backplane and the X80 EIO adapter BMECRA31210 (SV>=2.10)" are selected:

Topological Address: [131]		1
		Can
art Number	Description	He
Modicon M580 remote drop	Modicon M580 remote drop	
B Rack		
BME XBP 0400	4 SLOTS ETHERNET BACKPLANE	
BME XBP 0602	6 SLOTS REDUNDANT ETHERNET BACKPLANE	
BME XBP 0800	8 SLOTS ETHERNET BACKPLANE	
BME XBP 1002	10 SLOTS REDUNDANT ETHERNET BACKPLANE	
BME XBP 1200	12 SLOTS ETHERNET BACKPLANE	
BMX XBP 0400	4 SLOTS BACKPLANE	
BMX XBP 0600	6 SLOTS BACKPLANE	
BMX XBP 0800	8 SLOTS BACKPLANE	
BMX XBP 1200	12 SLOTS BACKPLANE	
Quantum M580 remote Drop	Guantum MS8U remote Drop	
Guantum M580 remote Drop	Guantum MS8U remote Urop	
Top end communicator	Guantum Mostu remote Urop	
Cuantum M580 remote Drop	Description	
Top end communicator ME CRA 312 10 (SV > 2 00) ME CRA 312 10 (SV > 2 10)	Quantum Mosturrenote Unop Description X80 performance EIQ adapter (SV >= 2,14 for M580 H58Y) X80 performance EIQ adapter (SV >= 2,14 for M580 H58Y)	
rop end communicator ME CRA 312 10 (SV >= 2 00) ME CRA 312 10 (SV >= 2 00) ME CRA 312 10 (SV >= 2 00)	Description X80 performance EIO adapter (SV >= 2.14 for M580 H58Y) X80 performance EIO adapter (SV >= 2.14 for M580 H58Y) X80 adapter (SV >= 2.14 for M580 H58Y)	
Guantum M580 remote Drop rop end communicator ME CRA 312 10 (SV >= 2.00) MC CRA 312 10 (SV >= 2.10) MX CRA 312 10 (SV >= 2.00) MX CRA 312 10 (SV >= 2.00)	Description X80 performance EIO adapter (SV >= 2.14 for M580 H58Y) X80 performance EIO adapter (SV >= 2.14 for M580 H58Y) X80 standard EIO adapter (SV >= 2.00) X80 standard EIO adapter (SV >= 2.00)	





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• Inserted backplane and EIO Drop adapter:



• Double-click on the first empty slot to insert the power supply:



• Select the power supply module BMXCPS2010 and click on the button "OK":

w Device			
Topological Address:		\2.1\0	OK Cancel
Part Number	Description		Help
∃ Modicon M580 remote drop	Modicon M580 remote drop		
Supply			
BMX CPS 2000	STANDARD AC POWER SUPPLY		
BMX CPS 2010	STANDARD ISOL DC POWER SUPPLY		
BMX CPS 3020	HIGH POWER ISOL 24 TO 48 VDC POWER SUPPLY		
BMX CPS 3500	HIGH POWER AC POWER SUPPLY		
BMX CPS 3540	HIGH POWER DC POWER SUPPLY		
BMX CPS 4002	REDUNDANT AC POWER SUPPLY (DOUBLE FORMAT)		

• Inserted Power Supply module:





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EIO adapter CRA31210 Device Name

• The device name of the EIO adapter BMECRA31210 must be configured on the card itself thanks to the rotary switches as well as in Unity Pro in the card parameters.

In this example, the address is set to **1** on the BMECRA31210 EIO adapter thanks to the rotary switches. This corresponds to the device name "BMECRA_**001**":



Both rotary switches allow the user to set addresses from **0** to **159**, which correspond to device name BMECRA_**000** to BMECRA_**159**.

• Rotary switches configuration example for device name "BMECRA_131":



• In the Unity Pro Project Browser, double-click on the field "0 : BMECRA31210 (SV>=2.10)" to check the device name:





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• In this example, the device name is BMECRA_001. Click on the link "Update IP/DHCP configuration" for changing the device name if needed:

X80 performance EIO adapter (SV >= 2.14 for M580 HSBY)

📕 Overview 🛛 🖷 I	Device DDT 🛛 🛗 RSTP	SNMP Solution	ervicePort	Parameters
Address information Device Name :	BMECRA_001	Tens: 0	Ones: 1	
IP Address :	10 . 126 . 105 . 32			
Provide Full Constraints of Provide				

• If needed, change **the 3 digits** of the device name Identifier. In this example, EIO adapter device name is **BMECRA_001**:

10000	Ethernet Network										
	Name	Туре	Subtype •	Profiles	Topo address	DHCP Enable	IP Address	Subnet Mask	Gateway Address	Identified By	Identifier
	BMEP58_ECPU_EXT	Scanner	Scanner RIO/DIO	Distributed Remote	0.0/0.0	Yes	A: 192.168.11.1 Main : 192.168.10.1	255.255.0.0 255.255.0.0	192.168.10.1		
000	BMECRA_001	Module	CRA	Remote	2.1/0.0	Yes	192.168.11.2	255.255.0.0	192.168.10.1	Device Name	BMECRA_001

• Save the configuration by clicking on the symbol "Validate" in the tool bar:

File Edit View	Services	Tools	Build	PLC	Debug
12 🚅 🖬 🕘	line X		9		P G
🔁 🛧 🗉 🖯	Q -			V	alidate

 \rightarrow For the next steps, the EIO adapter device name is **BMECRA_001**.

3.1.2.2.2 HART Analog Input Module AHI0812

• Double-click on Slot 1 to insert a HART analog input module for this example.





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• Select the HART analog input module BMEAHI0812 and click on the button "OK":

w Device		×
Topological Address:	\2.1\0.1	OK Cancel
Part Number	Description	Help
⊡ Modicon M580 remote drop Analog	Modicon M580 remote drop	-
BME AHI 0812	Ana 8 In Current Isolated HART	
BME AHO 0412	Ana 4 Out Current Isolated HART	
BMX AMI 0410	Ana 4 U/I In Isolated High Speed	

• Double-click on Slot 2 to insert another HART analog input module for this example:



• Select the HART analog input module BMEAHI0812 and click on the button "OK":

New Device		X
Topological Address:	\2.1\0).2 Cancel
Part Number	Description	Help
	Modicon M580 remote drop	
Analog		
BME AHI 0812	Ana 8 In Current Isolated HART	
BME AHO 0412	Ana 4 Out Current Isolated HART	
BMX AMI 0410	Ana 4 U/I In Isolated High Speed	

• Double-click on the analog input module AHI0812:





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• This displays the 8 configured analog inputs channels:

	Configu	ration								
П	Used	1		Symbol		Rang	e	Scale	Fil	ite
	0 🔽	EIO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	LIN[0].ANA.VALUE	420 mA	-	%	0	-
	V	ElO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	LIN[1].ANA.VALUE	420 mA	-	%	0	-
	2 🔽	ElO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	LIN[2].ANA.VALUE	420 mA	-	%	0	
	3 🔽	ElO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	LIN[3].ANA.VALUE	420 mA	-	%	0	-
	+ 🗸	ElO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	I_IN[4].ANA.VALUE	420 mA	-	%	0	-
	5 🔽	ElO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	LIN[5].ANA.VALUE	420 mA	-	%	0	-
	5 🔽	ElO2_d1_r0	_s1_EAHI0_S	22QU3.ANA_CH	LIN[6].ANA.VALUE	420 mA	-	1	0	-
	7 📝	ElO2 d1 r0	s1_EAHI0_S	22QU3.ANA_CH	I_IN[7].ANA.VALUE	420 mA	-	1%	0	

• Channels can be activated or deactivated by clicking in the corresponding channel checkbox. Channels 5, 6 and 7 have been deactivated in this example:

Ana 8 In Current Isolated HART

BME AHI 0812 (EIO2_d1_r0_		Configu	ration				
Channel 1		Used	Symbol	Range	•	Scale	Filter
Channel 3	0	V	EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[0].ANA.VALUE	420 mA	-	1% 💽	0 🖵
Channel 4	1		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[1].ANA.VALUE	420 mA	-	%	0 🖵
Channel 5	2		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[2].ANA.VALUE	420 mA	-	%	0 🖵
Channel 6	3		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[3].ANA.VALUE	420 mA	-	%	0 🖵
Channel 7	4		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[4].ANA.VALUE	420 mA	-	%	0 🖵
	5		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[5].ANA.VALUE	420 mA	-	%	0 🖵
	6		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[6].ANA.VALUE	420 mA	-	%	0 🖵
	7		EIO2_d1_r0_s1_EAHI0_S22QU3.ANA_CH_IN[7].ANA.VALUE	420 mA	-	%	0

- Default settings are used in this example. The "Scale" configuration is 4.20mA from 0 to 10000 (0% to 100%) and the "Filter" option is set to 0 (No Filtering).
- Scaling ranges can be changed by clicking on the arrow in the "Scale" column:

BME AHI 08	812 (ElO2_d1_r0_	Configuration				
Channe Channe Channe	1 2 3	Used 0 V ElO2_d1_r0_s	Symbol [EAHI0_S22QU3.ANA_CH_IN[0].ANA.VALU	Range	Scale	Filter
arameters channel	0 🗾	•				
Scale Scaling 0%-> []						
100%-> 10 Overflow	,000					
Below: I Ch	-800 ecked					
Above:	10,800 ecked					

• Please refer to the user manual of the AHI0812 card for further information.



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3.1.2.2.3 HART Analog Output Module AHO0412

• Double-click on Slot 3 to insert a HART analog output module for this example:



• Select the HART analog output module BMEAH00412 and click on the button "OK":

w Device		
Topological Address:	\2.1\0.3	OK Cancel
Part Number	Description	Help
⊡ Modicon M580 remote drop	Modicon M580 remote drop	
Analog		
BME AHI 0812	Ana 8 In Current Isolated HART	
BME AHO 0412	Ana 4 Out Current Isolated HART	
BMX AMI 0/10	App 4 11/1 In Indiated High Speed	

• Inserted module for this example:



• Double-click on the analog output module AHO0412:

roject	Browser
EB	Structural view
	🕽 Project
	Configuration
	😑 📲 🖳 0 : PLC bus
	E 2 : EIO Bus
	🚊 🛶 1 : Modicon M580 remote drop
	(P) (P) : BMX CPS 2010
	0 : BME CRA 312 10 (SV >= 2.10)
	1 : BME AHI 0812
	2 : BME AHI 0812
	3 : BME AHO 0412
	, Derived Data Types



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• This displays the 4 configured analog outputs channels:

Ana 4 Out Current Isolated HART								
BME AHO 0412 (EIO2_d1_r0	00	Configuration						
Channel 2		Symbol	Rang	e	Scale	Fallback	Fallback value	Viring CTRL
			4 00 - 4		1		0	
Channel 3	0	EI02_d1_r0_s3_EAH00_57W50R.ANA_CH_OUT[0].ANA.VALUE	1420 mA	-	7		· ·	
Channel 3	0	EIO2_d1_r0_s3_EAHO0_57W50R.ANA_CH_OUT[0].ANA.VALUE EIO2_d1_r0_s3_EAHO0_57W50R.ANA_CH_OUT[1].ANA.VALUE	420 mA	*	7 7	✓ ✓	0	
Channel 3	0 1 2	EI02_d1_r0_s3_EAH00_57W50R.ANA_CH_0UT[0].ANA.YALUE EI02_d1_r0_s3_EAH00_57W50R.ANA_CH_0UT[1].ANA.YALUE EI02_d1_r0_s3_EAH00_57W50R.ANA_CH_0UT[2].ANA.YALUE	420 mA 420 mA 420 mA	* * *	7 7 7		。 0 0	

• Click on the arrow in the "Scale" column:

Ana 4 Out Current Isolated HART

BME AHO 0412 (EIO2_d	Configuration					
Channel 1						
Channel 2	Symbol	Range	Scale	Fallback	Fallback value	Viring CTRL
Channel 3	0 EIO2_d1_s3_EAHO0_57V5OR.ANA_CH_OUT[0].ANA.VALUE	420 mA 🖕	% 🖪	V	0	

• This displays the default scaling settings (0 to 10000):

Parameters chan	nel 0 💌
Scale Scaling	
0%-> 100%->	0
Overflow	
Below:	-800 Checked
Above:	10,300 Checked

- Other settings in this example:
 - "Fallback" and "Fallback value" are used: that means the actuator receives the "Fallback value" when the PLC is in STOP. If the "Fallback" option is not selected, the actuator maintains its position.
 - "Wiring CTRL" option: this option checks for a broken wire.
- Please refer to the AHO0412 user manual for further information.



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3.1.2.3 HART Device Connection

• The following table displays how the Endress+Hauser devices of the SEO2 Topology are connected on the Schneider Electric environment:

Device	Power Supply	AHI0812 Card 1		ABE-7C Block 1 Te	PA03 rminals	AHI0812 Card 2		ABE-7C Block 2 Te	PA03 erminals	AH00412	Ble	ABE-7C	PA21 rminals
D	E dament	10	+	ICO	202								
Promag10	External	AU	-	0V0	203								
Promag50	Extornal	۸1	+	IC1	102								
FIOIIIag50	External	AI	-	0V1	103								
Cerahar M	Loon	Α2	+	IS2	204								
	цоор	112	-	IC2	206								
Prosonic S	External	Δ3	+	IC3	106								
110501110 5	Externa	115	-	0V3	107								
Liquiline CM442	External	Δ/ι	+	IC4	210								
Elquinie CM442	LACCINAL	ЛТ	-	0V4	211								
Promag 400	Fyternal					A0	+	ICO	202				
1 Tolliag 400	LAUCITIAI					AU	-	0V0	203				
iTEMP TMT82	Loon					Δ1	+	IS1	100				
	цоор					711	-	IC1	102				
Cerahar S	Loon					Δ2	+	IS2	204				
Cerubar 5	цоор					112	-	IC2	206				
Prosonic M	Loon					Δ3	+	IS3	104				
T TOSOILLE MI	цоор					115	-	IC3	106				
Micropilot	Loon					Δ/ι	+	IS4	208				
Microphot	гоор					лт	-	IC4	210				
AUMATIC	External									40	+	CH0	100
AUMAIIC	LACCINAL									AU	- (COM0	200

• Please refer to the AHI0812/AHO0412 user manual for the power supply and wiring concept.





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3.1.3 Network Configuration

3.1.3.1 M580 PLC IP Address

• In the Project Browser, double-click on the field "EIO":



• Following window is displayed:

2 C Security	IPConfig	RSTP	SNMP	I NTP	0	Service Port	5]			
Global policy	,									
		Enforce Sec	urity					Unlock Sec	urity	
	<u></u>									
Services							-			_
	FIP : Dis	abled	•	DH	СР / В	0019 :	Disat	bled		•
	TFTP : Dis	abled	•		1	SNMP :	Disat	oled		•
						5255				_
	HTTP : Dis	abled	•			EIP :	Disat	bled		•
Access Con Enabled	trol	abled	•			EIP :	Disat	bled		•
Access Con Enabled Subnet	trol	• • •ss	▼ Subnet ma	isk j	FTP	EIP :	Disat	Port502	EIP	SNMP
Access Con Enabled Subnet Yes	trol IP Addree 192.168.1	•) •) •) •) •) •)	• Subnet m: 255.255.0	isk	FTP		Disat	Port502	EIP	SNMP
Access Con Enabled Subnet Yes y No y	trol IP Addre 192.168.1	•) •:ss 0.1	Subnet ma 255.255.0	isk .0	FTP		HTTP	Port502	EIP	SNMP
Access Con Enabled Ves x No x No x	trol IP Addre 192.168.1	v) v) v) v) v) v) v) v) v) v) v) v) v) v	Subnet ma 255.255.0	isk	FTP		HTTP	Port502	EIP	SNMP
Access Con Enabled Yes y No y No y	trol IP Addre 192.168.1	viss	Subnet ma 255.255.0	15 k	FTP		Disat	Port502		SNMP
Access Con Enabled Ves v No v No v	ITTP : Dis	viss 0.1	Subnet ma 255.255.0	ışk	FTP			Port502		SNMP
Access Con Enabled Yes w No w No w No w No w	trol IP Addre 192.168.1	v v v 0.1	Subnet ma 255.255.0	ısk			HTTP]	Port502		SNMP

• In the Tab "Security", click on the button "Unlock Security". This enables the options "Services":

	Enforce Sec	curity		Unlock Sec	urity
ervices					
FTP :	Enabled	-	DHCP / BOOTP :	Enabled	•
TFTP :	Enabled	•	SNMP :	Enabled	•
HTTP :	Enabled	•	EIP :	Enabled	•



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• Select the Tag "IPConfig" and configure the IP addresses of the PLC according to the connected network:

CommHeadRIODIO8L2	Security	IPConfig	RSTP	SNMP	III NTP	Service Por
	IP address con Main IP	figuration address 10	. 126 . 105 . 30	1		
	Main IP ad	dress +1 0	. 0 . 0 . 0	(Used for Hot Standby)		
	IP ad	dress A þio	. 126 . 105 . 31			
	IP ad	dress B 0	. 0 . 0 . 0	(Used for Hot Standby)		
	Subnetwo	rk mask 258	. 255. 252. 0			
	Gateway	address 10				
	URA IP addres	s configuration				

In this example:

- The main PLC IP address is <u>10.126.105.30</u>
- The PLC IP address A is <u>10.126.105.31</u>
- The subnet mask is <u>255.255.252.0</u>
- The default gateway IP address is <u>10.126.104.1</u>
- Save the configuration by clicking on the symbol "Validate" in the tool bar:

File Edit View	Services	Tools	Build	PLC	Debug
12 🖻 🖬 🕘	line X		n ai		p e,
🔁 🛧 🗖 🖯	Q -			V	alidate





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3.1.3.2 EIO Adapter CRA31210 IP Address and Device Name

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

• In the Project view, double-click on the EIO adapter card:



• Check the configured IP address of the EIO adapter in the tab "Parameters":

Overview 1	Device DDT 🛛 🛅 RSTP	SNMP 🖷 Ser	vicePort 🖑 Parame	eters 👖 TimeStan
- Address information				
Device Name :	BMECRA_001	Tens: 0	Ones: 1	
IP Address :	10 . 126 . 105 . 32			
Sub Network :	255 . 255 . 252 . 0			
Update IP/DHCP of	onfiguration			
Hold up time				
Hold up time :	1,000 🔷 ms			
Connection parameter	er			
			Application trians	

• If needed, the EIO adapter IP address can be changed. Click on the link "Update IP/DHCP configuration":

Overview	🖑 Devi	ice DDT	RSTP	SNMP	🖑 ServicePort	🖑 Parameters	💾 TimeStamping
Address info Device Nar	rmation ne :	BMECRA_0	01	Tens: 0	Ones: 1		
IP Address	:	10 . 126	. 105 . 32				



•

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• Click on the IP address field for changing the IP address:

Ethernet Network	Ethernet Network												
Name	Туре	Subtype	Profiles	Topo address	DHCP Enable	IP Address	Subnet Mask	Gateway Address					
BMEP58_ECPU_EXT	Scanner	Scanner RIO/DIO	Distributed Remote	0.0/0.0	Yes	A: 10.126.105.31 Main : 10.126.105.30	255.255.252.0 255.255.252.0	10.126.104.1					
BMECRA_001	Module	CRA	Remote	2.1/0.0	Yes	10.126.105.32	255.255.252.0	10.126.104.1					

• Save the configuration by clicking on the symbol "Validate" in the tool bar:

File Edit View	Services	Tools	Build	PLC	Debug
12 🖻 🖬 🕘	line X		0 0		p q
日 日 舟 🛃	Q -			V	alidate

 \rightarrow For the next steps, the EIO adapter IP address is set to the IP address <u>10.126.105.32</u>.

3.1.3.3 HART Analog Input AHI0812 Module 1 IP Address and Identifier

Click on the menu "Tools \rightarrow DTM Browser" in the Tool bar:

- File Edit View Services Tools Build PLC Debug Window Help ✓ Project Browser Alt+1 12 🚅 🖬 🎒 in X Hardware Catalog Alt+2 🔚 売 田 🖂 🔍 👻 Types Library Browser Alt+3 Project Browser Operator Screen Library Alt+4 E Structural view Search / Replace Alt+5 Noject Configuration Diagnostic Viewer Alt+6 Rev. 0 : PLC bus PLC Screen Alt+7 0 : BM Ė Variable Window Alt+8 Data Editor Alt+9 Bookmarks Alt+Shift+2
- The DTM Browser displays already the configured PLC IP address, <u>10.126.105.30</u> in this example:





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• Right-click on the DTM "BMEP58_ECPU" and select the menu "Add...":

DTM Browser		
 10.126.105.30 > BMEP58_ Remote Bus 	Open	
	Add	
	Delete Field bus discove	Del

• Select the device "BMEAHI0812" and click on the button "add DTM":

Device	Туре	Vendor	Version	Date	
140NOC77100 (from EDS)	Device	Schneider Electric	1.1		
140NOC77101 (from EDS)	Device	Schneider Electric	1.1		
140NOC78000 (from EDS)	Device	Schneider Electric	1.52		
140NOC78100 (from EDS)	Device	Schneider Electric	1.52		
Advanced Generic EDS	Device	Schneider Electric	1.2.1.0		
ALTIVAR61 Revision 1.5 (Device	Schneider Electric	1.5		
ALTIVAR61 Revision 2.1 (Device	Schneider Electric	2.1		
ALTIVAR71 Revision 1.6 (Device	Schneider Electric	1.6		
ALTIVAR71 Revision 2.7 (Device	Schneider Electric	2.7		
ALTIVAR71 Revision 3.3 (Device	Schneider Electric	3.3		
BME AHI 0812	Gateway	Schneider Electric	1.1.5.0	2016-06-20	1
BME AHO 0412	Gateway	Schneider Electric	1.1.5.0	2016-06-20	
BME CXM 0100 (H)	Gateway	Schneider Electric	1.0.00	2016-08-26	
BMEH582040 (from EDS)	Device	Schneider Electric	2.10		
BMEH584040 (from EDS)	Device	Schneider Electric	2.10		
BMEH586040 (from EDS)	Device	Schneider Electric	2.10		
BMENOC0301 (from EDS)	Device	Schneider Electric	1.1		
BMENOC0301 Revision 2	Device	Schneider Electric	2.4		
BMENOC0311 (from EDS)	Device	Schneider Flectric	11		-

• Enter a DTM name for the project and click on the button "OK". In this example the project DTM name is "BME_AHI_0812_Card1":







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• The DTM is inserted in the project view with a generated IP address, which is <u>10.12.105.33</u> in this example:



• Double-Click on the DTM "BMEP58_ECPU":



• Select the card "BME_AHI_0812_Card1" in the menu "Device List" and click on the tab "Address Setting":

BMEP58_ECPU_EXT Communication BME P58 2040		
Channel Properties	Properties Address Setting	
Services	IP Configuration	
Address Server EtherNet/IP Local Slaves	IP Address:	10 , 126 , 105 , 33
E Local Slave 1	Subnet Mask:	255 . 255 . 252 . 0
Local Slave 2	Gateway:	10 . 126 . 105 . 30
Local Slave 3		
Device List	Address Server	
Exclusive Owner	DHCP for this device:	Enabled 🔹
Exclusive Owner Connection	Identified by:	Device Name 💌
Logging	Identifier:	Mx80_01_AHI0812

Two parameters must be configured in the tab "Address Setting": the **IP address** and the **Identifier**.





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IP address Configuration

• Configure the new IP Address. In this example, the new IP address is 10.126.105.55:

Channel Properties	Properties Address Setting	
Address Server Address Server EtherNet/IP Local Slaves Local Slave 1 Local Slave 2 Local Slave 3	IP Configuration IP Address: Subnet Mask: Gateway:	10 . 126 . 105 . 55 255 . 255 . 252 . 0 10 . 126 . 105 . 30
Items Device List [001] BMECRA_001 < EIP: 10.126.105.32> Exclusive Owner	Address Server DHCP for this device:	Enabled
i → f [515] BME_AHI_0812_Card1 <eip: 10.126.105.55=""> Exclusive Owner Connection Items</eip:>	Identified by:	Device Name
Logging	Identifier:	Mx80_01_AHI0812

Identifier Configuration

• The Identifier naming is composed of three parts, which are the Rack ID, Slot Number and Device Name as explained in the AHI0812 user manual :

Parameter	Description
Rack ID	 A 4-character field that identifies the rack used for the module: Mx80: a main local rack M58A: primary rack in a Hot Standby network design M58B: standby rack in a Hot Standby network design Cxxx: remote I/O rack, where: C indicates CRA xxx represents the rack number, an integer from 000159
Slot Number	A field that identifies the position of the module in the rack.
Device Name	Use the following module names for the purpose of generating a Device Name : • the string "AHI0812" (not including quotation marks) for the BME AHI 0812 module • the string "AHO0412" (not including quotation marks) for the BME AHO 0412 module

Sample device name identifiers could be:

- Mx80_02_AHI0812 for a BME AHI 0812 module located at slot 2 of a main rack.
- M58A_03_AHI0812 for a BME AHI 0812 module located at slot 3 of a primary Hot Standby rack
- M58B_04_AHO0412 for a BME AHO 0412 module located at slot 4 of a standby Hot Standby rack
- C001_05_AHO0412 for a BME AHO 0412 module located at rack 1, slot 5 of a remote I/O rack





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• In this example, the **default Identifier** is "Mx80_01_AHI0812":

	F
DHCP for this device:	Enabled
Identified by:	Device Name
Identifier	Mx80 01 AHI0812

This must be changed because the card is located on the X80 Remote IO Rack.

• The correct Identifier is "C001_01_AHI0812" (RackID=1, SlotNr=1, DeviceName=AHI0812):

DHCP for this device:	Enabled	•
Identified by:	Device Name	Ŧ
Identifier:	C001_01_AHI0812	

• Click on the button "Apply" when both options are configured and close the window:

BMEP58_ECPU_EXT Communication BME P58 2040		Schneider Blectric
Channel Properties TCP/IP Services Laddress Server EtherNet/IP Local Slaves Local Slave 1 Local Slave 2 Local Slave 2 Local Slave 3 L	Properties Address Setting IP Configuration IP Address: IP Address: 10 . 126 . 105 . 55 Subnet Mask: 255 . 255 . 252 . 0 Gateway: 10 . 126 . 105 . 30 Address Server I0 . 126 . 105 . 30 DHCP for this device: Enabled Identified by: Device Name Identifier: C001_01_AHI0812	
Help		OK Cancel Apply





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3.1.3.4 HART Analog Input AHI0812 Module 2 Address and Identifier

• In the DTM Browser view, right-click on the DTM "BMEP58_ECPU" and select the menu "Add...":

Host PC		
☐ Q < 10, 126, 105, 30 > BMEP58_ECPU	Open	
Distributed Bus	Add	
< EtherNet IP: 10. 126. 105	Delete	Del
	Field bus discovery	

• Select the device "BMEAHI0812" and click on the button "add DTM":

	Device	Туре	Vendor	Version	Date	*
-	140NOC77100 (from EDS)	Device	Schneider Electric	1.1		
	140NOC77101 (from EDS)	Device	Schneider Electric	1.1		
	140NOC78000 (from EDS)	Device	Schneider Electric	1.52		
	140NOC78100 (from EDS)	Device	Schneider Electric	1.52		
	Advanced Generic EDS	Device	Schneider Electric	1.2.1.0		
	ALTIVAR61 Revision 1.5 (Device	Schneider Electric	1.5		
	ALTIVAR61 Revision 2.1 (Device	Schneider Electric	2.1		
	ALTIVAR71 Revision 1.6 (Device	Schneider Electric	1.6		
	ALTIVAR71 Revision 2.7 (Device	Schneider Electric	2.7		
A	ALTIVAR71 Revision 3.3 (Device	Cohnoider Electric	22		-
100		DOVICO	Schneider Electric	3.3		
Ĩ	BME AHI 0812	Gateway	Schneider Electric	1.1.5.0	2016-06-20	Ľ.
Ĩ	BME AHI 0812 BME AHO 0412	Gateway Gateway	Schneider Electric Schneider Electric	1.1.5.0 1.1.5.0	2016-06-20 2016-06-20	
Ī	BME AHI 0812 BME AHO 0412 BME CXM 0100 (H)	Gateway Gateway Gateway	Schneider Electric Schneider Electric Schneider Electric	1.1.5.0 1.1.5.0 1.0.00	2016-06-20 2016-06-20 2016-08-26	
	BME AHI 0812 BME AHO 0412 BME CXM 0100 (H) BMEH582040 (from EDS)	Gateway Gateway Gateway Device	Schneider Bectric Schneider Electric Schneider Electric Schneider Electric	1.1.5.0 1.1.5.0 1.0.00 2.10	2016-06-20 2016-06-20 2016-08-26	
	BME AHI 0812 BME AHO 0412 BME CXM 0100 (H) BMEH582040 (from EDS) BMEH584040 (from EDS)	Gateway Gateway Gateway Device Device	Schneider Bectric Schneider Bectric Schneider Electric Schneider Electric Schneider Electric	3.3 1.1.5.0 1.1.5.0 1.0.00 2.10 2.10	2016-06-20 2016-06-20 2016-08-26	-
	BME AHI 0812 BME AHO 0412 BME CXM 0100 (H) BMEH582040 (rom EDS) BMEH580400 (rom EDS) BMEH586040 (rom EDS)	Gateway Gateway Gateway Device Device Device	Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric	3.3 1.1.5.0 1.0.00 2.10 2.10 2.10	2016-06-20 2016-06-20 2016-08-26	
	BME AHI 0812 BME AHO 0412 BME CXM 0100 (H) BMEH582040 (from EDS) BMEH580400 (from EDS) BMEH580040 (from EDS) BMEHS0040 (from EDS) BMENOC0301 (from EDS)	Gateway Gateway Gateway Device Device Device Device	Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric	3.3 1.1.5.0 1.0.00 2.10 2.10 2.10 1.1	2016-06-20 2016-06-20 2016-08-26	
	BME AHI 0812 BME AHO 0412 BME CXM 0100 (H) BMEH882040 (from EDS) BMEH586040 (from EDS) BMEH586040 (from EDS) BMENOC0301 (from EDS) BMENOC0301 Revision 2	Gateway Gateway Gateway Device Device Device Device Device	Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric Schneider Electric	3.3 1.1.5.0 1.1.5.0 1.0.00 2.10 2.10 2.10 2.10 1.1 2.4	2016-06-20 2016-06-20 2016-08-26	

• Enter a DTM name for the project and click on the button "OK". In this example the project DTM name is "BME_AHI_0812_Card2":

Properties of device	×
General Device information DTM information Protocol information	
DTM name management	
Name : BME_AHI_0812_Card2	
OK Cancel Help	





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• The DTM is inserted in the project view with a generated IP address, which is <u>10.12.105.34</u> in this example:



• Double-Click on the DTM "BMEP58_ECPU":

DTM Brow	vser
🗟 Host	PC
- R	< 10.126.105.30 > BMEP58_ECPU_EXT
	🕲 Remote Bus
ė	😨 Distributed Bus
	EtherNet IP: 10. 126. 105. 33 > BME_AHI_0812_Card1
	EtherNet IP: 10. 126. 105. 34 > BME_AHI_0812_Card2

• Select the card "BME_AHI_0812_Card2" in the menu "Device List" and click on the tab "Address Setting" to update the IP address settings and the Identifier as done for the first HART analog input card in Chapter 3.1.3.3. Click on the button "Apply" to save:

Channel Properties	D Address Setting		O Electric
TCP/IP Address Server Local Slaves Local Slave 1 Local Slave 2 Local Slave 3	IP Configuration IP Address: Subnet Mask: Gateway:	10 . 126 . 105 . 56 255 . 255 . 252 . 0 10 . 126 . 105 . 30	
Local Slave 3 Items Device List Exclusive Owner Exclusive Owner [515] BME_AHI_0812_Card1 <eip: 10.126.105.55=""> Exclusive Owner Connection L Items Exclusive Owner Connection L Items Exclusive Owner Connection L Items Logging</eip:>	Address Server DHCP for this device: Identified by: Identifier:	Enabled Device Name C001_02_AHI0812	





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3.1.3.5 HART Analog Output AHO0412Module Address and Identifier

• In the DTM Browser view, right-click on the DTM "BMEP58_ECPU" and select the menu "Add...":

Host PC		
	Open	
E - R. Distributed Bus	Add	
< EtherNet IP:	Delete	Del
~	Field bus discovery	

• Select the device "BMEAHI0812" and click on the button "add DTM":

	Device	Туре	Vendor	Version	Date	-
1	140NOC77100 (from EDS)	Device	Schneider Electric	1.1		
1	140NOC77101 (from EDS)	Device	Schneider Electric	1.1		
	140NOC78000 (from EDS)	Device	Schneider Electric	1.52		
	140NOC78100 (from EDS)	Device	Schneider Electric	1.52		
	Advanced Generic EDS	Device	Schneider Electric	1.2.1.0		
	ALTIVAR61 Revision 1.5 (Device	Schneider Electric	1.5		
	ALTIVAR61 Revision 2.1 (Device	Schneider Electric	2.1		
	ALTIVAR71 Revision 1.6 (Device	Schneider Electric	1.6		
3	ALTIVAR71 Revision 2.7 (Device	Schneider Electric	2.7		
	ALTIVAR71 Revision 3.3 (Device	Schneider Electric	3.3		
T	BME AHI 0812	Gateway	Schneider Electric	1.1.5.0	2016-06-20	
1	BME AHO 0412	Gateway	Schneider Electric	1.1.5.0	2016-06-20	1
i	BME CXM 0100 (H)	Gateway	Schneider Electric	1.0.00	2016-08-26	
	BMEH582040 (from EDS)	Device	Schneider Electric	2.10		
	BMEH584040 (from EDS)	Device	Schneider Electric	2.10		
	BMEH586040 (from EDS)	Device	Schneider Electric	2.10		
	BMENOC0301 (from EDS)	Device	Schneider Electric	1.1		
-	BMENOC0301 Revision 2	Device	Schneider Electric	2.4		
	PMENOC0211 from EDS)	Device	Schneider Electric	11		-

• Enter a DTM name for the project and click on the button "OK". In this example the project DTM name is "BME_AHO_0412":

operties	of device	-2
General	Device information DTM information Protocol information	
DTM	name management	
Name	e : BME_AHO_0412	
	OK Cancel Help	





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• The DTM is inserted in the project view with a generated IP address, which is <u>10.12.105.35</u> in this example:

DTM Browse	ri
ୠ Host PC	
🚊 - 限 < 10). 126. 105. 30 > BMEP58_ECPU_EXT
	Remote Bus
ė- 4 0 I	Distributed Bus
	EtherNet IP: 10. 126. 105. 33 > BME_AHI_0812_Card1
	EtherNet IP: 10. 126. 105. 34 > BME_AHI_0812_Card2
	C < EtherNet IP: 10, 126, 105, 35 > BME_AHO_0412

• Double-Click on the DTM "BMEP58_ECPU":



• Select the card "BME_AHO_0412" in the menu "Device List" and click on the tab "Address Setting" to update the IP address settings and the Identifier as done for the first HART analog input card in Chapter 3.1.3.3. Click on the button "Apply" to save:

26 . 105 . 57 55 . 252 . 0 26 . 105 . 30
26 . 105 . 57 55 . 252 . 0 26 . 105 . 30
26 . 105 . 57 55 . 252 . 0 26 . 105 . 30
55 . 252 . 0 26 . 105 . 30
55 . 252 . 0
25 . 105 . 30
26 . 105 . 30
me 🔻
AH00412
7



3.1.4 Connection to PLC

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

In this example, the PLC IP address is at first downloaded via USB. Then, it is the Ethernet connection which is used.

3.1.4.1 Connection via USB Interface

- Connect the USB cable from the PLC USB port to the engineering station one.
- In the tool bar, click on the menu "PLC \rightarrow Set <u>A</u>ddress":

File Edit View	Services Tools	s Build	PLC Debug Window Help		
1111 🖻 🖬 🥔	🗄 🖻 🐰 💼 🛛	5 0	<u>C</u> onnect	Ctrl+K	
			Set <u>A</u> ddress		_

• Select the Address type "SYS" and the Media type "USB":

Set Address		? 🔀
✓ PLC Address SYS	Simulator Address 127.0.0.1 Media	■ Bandwidth ■ Test Connection
USB Communication Parameters	TCPIP	OK ication Parameters Cancel
V Speed rate auto-adaptation at the end of	download	Help

• Test if the connection is established by clicking on the button "Test Connection". If successful, following message is displayed:

-			
Succ	essfully connected	ed to the curr	ently selected target.

Click on the button "OK".

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



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3.1.4.2 IP settings Configuration Download via USB

Download the IP configuration in the PLC:
 →Refer to chapter 0 to proceed.

3.1.4.3 Connection via Ethernet

• In the tool bar, click on the menu "PLC \rightarrow Set <u>A</u>ddress":

File Edit View Services Tools Build	PLC Debug Window Help	
📲 🖨 🖬 🚳 📗 🖿 🖌 💼 🗠 🗠 🗌	<u>C</u> onnect	Ctrl+K
	Set <u>A</u> ddress	

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

		Bandwidth
Address		Danamati
127.0.0.1	• 💼	Test Connection
Media		
TCPIP	-	ОК
Commu	nication Parameters	Cancel
	Address 127.0.0.1 Media TCPIP Commu	Address 127.0.0.1 Media TCPIP Communication Parameters

• Test if the connection is established by clicking on the button "Test Connection". If successful, following message is displayed:



Click on the button "OK".

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





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3.1.4.4 FDR Server Transfer

This step is needed to set the IP addresses of the HART cards configured in the DTM Browser.

• In the DTM Browser view, right-click on the DTM "BME_AHI_0812_Card1" and select the option "Device menu→Additional Functions→Transfer to FDR Server":



• Click on the button "Yes" to proceed:



• Transfer was successful. Click on the "OK" to close the window:







• In the DTM Browser view, right-click on the DTM "BME_AHI_0812_Card2" and select the option "Device menu→Additional Functions→Transfer to FDR Server":



• Click on the button "Yes" to proceed:



• Transfer was successful. Click on the "OK" to close the window:







• In the DTM Browser view, right-click on the DTM "BME_AHI_0812_Card2" and select the option "Device menu→Additional Functions→Transfer to FDR Server":

DTM Browser			
Host PC Void 105.30 > BMEPS8_ECPU_EXT Remote Bus Remote Bus Qotributed Bus Otributed Bus Cotributed Bus Cotribut	HI_0812_Card1 HI_0812_Card2		
<pre>cetherNet IP: 10. 126. 105. 57 > BME_</pre>	Open	1	
	Add Delete Del Field bus discovery		
	Sort by address		
	Connect Disconnect		
	Load data from device Store data to device		
	Copy Paste		
	Go to module or device		
	Device menu 🔶	Offline Parameter	
-	Properties ALT+Enter	Online Parameter	
-	Print device	Compare +	
-	Zoom out	Observe	
	Expand all	Diagnosis	
	Collapse all	Additional functions	Transfer to FDR Server

• Click on the button "Yes" to proceed:



• Transfer was successful. Click on the "OK" to close the window:




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3.1.5 HART Cards Configuration

- 3.1.5.1 HART Analog Input Cards Configuration
 - In the DTM Browser, double-click on the DTM "BME_AHI_0812_Card1":



• This opens the DTM offline configuration window:



- Different parameters can be modified in the menus "Module Overview", "General Information", "Multiplexer Status" and "Configuration".
- Default parameters are used for the menus "Module Overview", "General Information", "Multiplexer Status".

 \rightarrow Please refer to the AHI0812 user manual for further details.



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• Menu "Parameter Configuration" Update:

Expand the menu Configuration and select the menu "Parameter Configuration". In this example, HART Channels 5, 6 and 7 are disabled (Channels 5, 6 and 7 have been disabled in Chapter 3.1.2.2.2):

Address Table	Data Item Name		Configured Va	alue	User Defined Label	
Host Communication Status			255			
Instrument Status	- Channel 0		Enable	-		
Multiplexer Status	- Channel 1		Enable	-		
	- Channel 2		Enable	-		
SNMP Configuration	Channel 3		Enable	-		
Parameter Configuration	Channel 4		Enable	-		
EIP Configuration	- Channel 5	1	Disable	-		
	- Channel 6	1	Disable	-		
	- Channel 7	1	Disable	-		
	Channel 0 Setting					
			5			
	Fallback Mode Setting		Not a Numb	-		
	Channel 1 Setting					
		2	5	_		
	Fallback Mode Setting		Not a Numb	-		
	Channel 2 Setting					
	Restore to Defaults					
	Perform following command after a	pply:				

- Check always the "Perform following command after apply" message. E.g., changes in the "Parameter Configuration" tab require again a "Transfer to FDR Server" as done in Chapter 3.1.4.4.
- Click on the button "Apply" to save the modification:



• If asked for Modification Authorization, click on the button "Yes":



• After that, perform the requested "Transfer to FDR Server" as done in Chapter 3.1.4.4.



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3.1.5.2 HART Analog Output Cards Configuration

• In the DTM Browser, double-click on the DTM "BME_AHO_0412":

DTM Browser	
🔕 Host PC	
🗄 - 限 < 10.1	26.105.30 > BMEP58_ECPU_EXT
Rei Rei	mote Bus
🖃 🖳 Dis	tributed Bus
- T-R	< EtherNet IP: 10. 126. 105. 55 > BME_AHI_0812_Card1
-6	< EtherNet IP: 10. 126. 105. 56 > BME_AHI_0812_Card2
	< EtherNet IP: 10. 126. 105. 57 > BME_AHO_0412

• This opens the DTM offline configuration window:



- As for the AHI0812 card, different parameters can be modified in the menus "Module Overview", "General Information", "Multiplexer Status" and "Configuration".
- Default parameters are used for the menus "Module Overview", "General Information", "Multiplexer Status".

 \rightarrow Please refer to the AHO0412 user manual for further details.

3.2 Mapping of Process Values and Status to Control Strategy

3.2.1 New Program

In the Project Browser view, right-click on "Sections" and select the menu "New Section":
 Ethernet Network





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• Enter a Name for the new Section and select a language. Then click on the button "OK". In this example, the section name is "SE02_Commands" and the language is "FBD":

Name:	alization Conditi	on Comment		
SE02_Comm	ands			
Language:			Protection:	
FBD	•		None	

• New section is created:



3.2.2 eX80 HART Generic DFB Installation

The library "ex80_hart_generic_dfb.xdb" contains Universal and Common Practice HART Commands function blocks.

• Right-click on the menu "Derived FB Types" and select the menu "Import":





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• Project can be saved before the library import:



• Select the "ex80_hart_generic_dfb.xdb" file and click on the button "Import":



Import/export ∧ User errors ∧ FDT log event ∧ Search/Replace /





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3.2.3 4...20mA Inputs/Outputs

The 4...20mA signal is part of the card data structure (Device DDT). A device DDT is created for each new module.

• In the Project view, double-click on the analog input module AHI0812:



• Select the field "BME AHI 0812" and click on the tab "Device DDT":

Ana 8 In Current Isolated HART			
BME AHI 0812 (EIO2_d1_r	Overview	📱 Device DDT	
Channel 1 Channel 2	Ana 8	In current isolated HA	RT.
Channel 3 Channel 4	SPE	CIFICATIONS	
Channel 5	ту	pe of I/O	
Channel 7	Ra Mo	nge dularity	

• This displays the device DDT variable name attached to this card:

Ana 8 In Current Isolated HART	ſ			
BME AHI 0812 (EIO2_d1_r	🖑 Overview	Device DDT		
	Implicit device I Name : <u>EI02_d1_r0_s</u> Goto details		Type : T_U_ANA_STD_IN_8]



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• Update the name if needed, for example "X80_AI1_s1":

BME AHI 0812 (EIO2_d1_r	Overview Device DDT	
Channel 1 Channel 2 Channel 3 Channel 4 Channel 5 Channel 6 Channel 7	Implicit device DDT Name : <u> </u>	Type: T_U_ANA_STD_IN_8

• Save the modification by clicking on the shortcut button "Validate":

🧱 File Edit Vi	ew Services	Tools Build	PLC Debug	Window	Help
12 🖻 🖬 🚭	Pa X 🖻	5 3 2	\$ \$ \$ \$		1 2 1
🔚 🗄 🖽 🖂	Q -		/alidate		

• Confirm the modification by clicking on the button "Yes":



• Click on the button "Yes" to proceed:





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• Repeat the previous steps for the other cards of the X80 Remote IO:

Project Browser	
B Structural view	
Project	
Configuration	
E 2 : EIO Bus	
🚊 🧄 🎝 📩 1 : Modicon M580 remote drop	D . DDT
	Device DD1:
0 ; BME CRA 312 10 (SV >= 2.10)	X80_AI1_s1
1 : BME AHI 0812	AI2 s2 🗡 🗡
2 : BME AHI 0812 3 : BME AHO 0412	X80_A0_s3

3.2.4 HART Inputs/Outputs

HART data can be accessed for each card via a variable defined in the M580 Master DTM.

Double-click on the field "BMEP58_ECPU_EXT":



• Select the first analog input card and update the Variable Name if needed, for example "X80 AHI s1":





• Repeat the previous steps for the other cards of the X80 Remote IO:



3.2.5 Universal HART Commands

All universal HART Command function blocks are used in a similar manner. Each HART Command function block requires an "Interface Input" and an "Interface Output" signal as well as a BOOL input variable to activate the function block.

The following chapter shows how to configure these parameters for Command 0. All this is applicable for all other Commands later on.

3.2.5.1 HART CMD 0: Read unique Identifier

- HART CMD0 is the first function which needs to be configured in order to get the Module ID and Device ID parameters. These parameters are needed as Input for all other function blocks.
- In the "SE02_Commands" program page, right-click in the page and select the option "FBB Input Assistant":







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• Click on the "Browse" shortcut:

S Function Inp	ut Assistant				×
FFB type :					-
Instance :					- <u></u>
Prototype					
Name	Туре	no.	Comment	Entry field	

• Look for the HART CMDO function block by searching with "*com*". This displays available function blocks:

Function Input Assistant : FFB Type S	election						
			- Hel	On Type			
Function and Function Block types							
🚺 🍓 Name 🖃 🔭						V	EF 🔽 EFB 🔽 DFB
Libraries/Families	Name 🗸	no.	Type 🔻	Value	Comment	•	R/W Rights of
Application>			<dfb></dfb>				
			<dfb></dfb>				
	Com 15 Read DV/ UDV/ LDV/		(DED)				100
-7 325			<ufb></ufb>				1000
17 M2	Ecom_15_Read_PV_URV_LRV		<dfb></dfb>	-			
	Com_15_Read_FV_URV_LRV Com_35_Set_PV_URV_LRV Com_3_Read_variables_current		<dfb> <dfb> <dfb></dfb></dfb></dfb>				
			<dfb> <dfb> <dfb> <dfb></dfb></dfb></dfb></dfb>				

• Select the function block "Com_0_module_device" and click on the button "OK":

nction and Function Block types							
Name = *com*						V	EF 🔽 EFB 🔽 DFB
ibraries/Families	Name -	no.	Туре 🔻	Value	Comment	•	R/W Rights of Re
Application>			<dfb></dfb>				
Cillibset V11.1>	⊞ . Com_14_Transducer_Info		<dfb></dfb>				10
	⊞		<dfb></dfb>				100
	⊞		<dfb></dfb>				
	Com 3 Read variables current		<dfb></dfb>				
	Com 42 reset device		<dfb></dfb>				
	🕀 🕕 Com 8 Read Variable Class		<dfb></dfb>				

• Change the Instance name, "Com_0_module_CerabarM" in this example and click on the button "OK":

Btype: Com	_0_module_device	_			•
stance : Com	_0_module_CerabarM				•
Prototype					
Name	Туре	no.	Comment	Entry field	
- 🔶 Mod	DWORD	1			
- 🔶 Mod	DWORD	2	2		
🕒 🔶 Devi	DWORD	3			
🔷 🔶 Devi	DWORD	4			
Exte	Information_res00	5			:
inputs/	6				
🔶 Com	BOOL	6			
•		III			F
Add Pin	Remove Pir	n(s)		Help On	Туре



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• Click on the page for inserting the function block:



Input variables assignment

Module Polling Address

Click on the wire, enter the module polling address, "0" for this example and validate:

Com_0_module_CerabarM	Com_0_module_CerabarM
Com_0_module_device	Com_0_module_device
	0
Device_polling_add Device_ID_1	Device_polling_add Device_ID_1 Device_ID_2
ADDMX_String1 Extend_device_status	ADDMX_String1 Extend_device_status Com_0_enCom_0_en

• Device Channel

Click on the wire, enter the channel number, "3" for this example and validate:



• Device Polling Address

Click on the wire, enter the device polling address, "0" for this example and validate:





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• ADDMX_String1

Click on the wire, enter the value "0.0.3{10.126.105.55}UNC.CIP" for this example and validate:



The parameter "ADDMX_String1", '0.0.3{10.126.105.55}UNC.CIP', is made of six parts 'A.B.C{D}E.F':

- o 'A' contains the rack number of the communication module. This is application specific.
- 'B' contains the slot number of the communication module. This is application specific.
- 'C' contains the communication channel: This is always "3".
- 'D' contains the IP address of the HART module AHI0812/AH00412.
- 'E' contains the message type. This always 'UNC' (Unconnected message).
- 'F' contains the protocol type. This is always 'CIP'.
- Com_0_en

Click on the wire, enter the start bit, "startCMD0_CerabarM" for this example and validate:

C	om_0_module_CerabarM		2
42 20	Com_0_module_	device	
. 0—	Module polling add	Module ID 1 -	20
- 2-	Device channel	Module ID 2	80
· 0—	Device polling add	Device ID 1 -	-
	and the second se	Device ID 2 -	
'0.0.3{10.126.105.55}UNC.CIP'-	ADDMX_String1 Exten	d device status -	
		Com 0 on	
-	startUMDU_CerabarM	•	× v

• If the variable does not exist, a menu is asking for creating this variable with the correct type. Just validate:

Create va	riable?				
Name:	MD0_CerabarM	Type:	BOOL	•	<mark>√</mark> ×≪
Address:		Comme	ent:		

• Configured inputs:

18 24	Com_0_module_Cerabar	-M
	Com_0_mo	dule_device
42 40 10	0 Module_polling_add 2 Device_channel 0 Device_polling_add	Module_ID_1
0.0.3{10.126.105.55}UNC.CIF startCMD0_Cerabart	"	Device_ID_2



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Output variables assignment

• Module_ID_1:

Click on the wire and enter for example the variable "Module_ID1_CerabarM":

31	3	5
i.	Com_0_module_	CerabarM
92 19	Con	n_0_module_device
	Module_ID1_CerabarM	
	0—Device_polling	add Device ID 1
0.0.3{10.126.105.55 startCMD0_	}UNC.CIP'— ADDMX_String CerabarM— Com_0_en —	g1 Extend_device_status Com_0_en

• If the variable does not exist, a menu is asking for creating this variable with the correct type. Just validate:

		_			
Name:	_ID1_CerabarM	Type:	DWORD	•	✓X «
Address:		Comm	ent:		

• Assign all other outputs variables as done for "Module_ID_1":

	m 0 module Cerah	arM		
		1		
	Com_0_m	nodule_device		
1	and the second		and the second second second second	
· 0	Module polling add	Module ID 1	-Module_ID1_CerabarM	86
. 2—	Device channel	Module ID 2	-Module_ID2_CerabarM	10
· 0	Device polling add	Device ID 1	—Device_ID1_CerabarM	•
and the state of the second state of the		Device ID 2	—Device_ID2_CerabarM	12
'0.0.3{10.126.105.55}UNC.CIP'-	ADDMX String1	Extend device status	—extendedStatus_CMD0_C	CerabarM
startCMD0_CerabarM-	Com_0_en	Com_0_en		

Function Block activation/deactivation

- The function block is activated per default. However, an additional variable has to be set in order to trigger the activation/deactivation of the function block. This is recommended for using deviceDTMs either in Unity Pro or in FieldCare because only one HART master can be active with the same devices at the same time.
- Therefore, before using the HART Commands function blocks with a device, make sure that the corresponding deviceDTM is disconnected as wells as the HART module comDTM of the corresponding card on which is connected the device.





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• Right-click on the CMD0 function block and select the option "Properties":

Properties	Alt+Enter
Data Properties	Ctrl+Enter
Rename variable	
Create Variable	Shift+Enter
Help On Type	F1
Modify Value	
🙀 Initialize New Animation Table	Ctrl+Shift+T
🛐 Initialize Animation Table	Ctrl+T
initialize <u>S</u> earch	Ctrl+U
Replace Variables	
Replace FFB	
🕉 FF <u>B</u> Input Assistant	Ctrl+I
<u>R</u> efine	Ctrl+Q

• Select the option "Show EN/ENO" and click on the button "OK":

nstance name: Com_0_module_	mment Execute After: _CerabarM Input			Output	V Show	EN/ENO
Pin name	Туре	Expressi	Pin	Туре	Variable	Link
Module_polling Device_channel Device_polling ADDMX_String1 Com_0_en	INT INT INT string[50] BOOL	0 3 0 '0.0.3{1C startCM[Mod Dev Dev Exte Com	DWORD DWORD DWORD DWORD Information_res00 BOOL	Modul Modul Devic Devic Exten	
د ا		Þ	•	Ш		

• Inserted additional Inputs:

5.0	Com 0 module CerabarM	50 C
13	1	15
1	Com 0 module device	1
2		-
	0-Module polling add Module ID 1 - Module_ID1_Cel	rabarM
4.7	2 Device channel Module ID 2 Module ID2 Cel	rabarM
1 23	0 Device polling add Device ID 1 Device ID1_Cer	abarM
	Device ID 2 — Device ID2 Cer	abarM
'0.0.3{10.126.105.55}UNC.C	CIP' ADDMX String1 Extend device status extendedStatus	CMD0_CerabarM
startCMD0_Ceraba	arM_Com_0_enCom_0_en	

• Click on the wire and assign the corresponding variable:

Co	om 0 module Cerat	arM		-555
		1		- 23
	Com 0 n	nodule device	10 A	
· -	anable CMD			-65
· 0—	enable_CMD			- 12
. 2—	Device channel	Module ID 2	-Module_ID2_CerabarM	250
. 0_	Device polling add	Device ID 1	—Device_ID1_CerabarM	22
		Device ID 2	-Device ID2 CerabarM	
'0.0.3{10.126.105.55}UNC.CIP'-	ADDMX String1	Extend device status	-extendedStatus CMD0	CerabarM
startCMD0_CerabarM—	Com_0_en	Com_0_en		



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• If the variable does not exist, a menu is asking for creating this variable with the correct type. Just validate:



• Configured CMD0 Function Block:

Com (L module CerabarM	
	*
Com 0 module device	
enable_CMD—EN ENO	1 11
0 Module polling add Module ID 1 Module_ID1_CerabarM	20
2 Device channel Module ID 2 Module ID2 CerabarM	
0 Device polling add Device ID 1 Device D1 CerabarM	61
Device ID 2 — Device_ID2_CerabarM	and the second
'0.0.3{10.126.105.55}UNC.CIP' ADDMX String1 Extend device status ExtendedStatus_CMD0_(CerabarM
startCMD0_CerabarM_Com_0_enCom_0_en	

3.2.5.2 HART CMD 3: Read dynamic variables and loop current

• HART CMD3 function block:

Co	om_3_CerabarM	3. 1
enable CMD-	2 Com_3_Read_variables_current	
Module_ID1_CerabarM—	Info_command3 Module_ID_1 Write_complete	
Module_ID2_CerabarM— Device_ID1_CerabarM—	Module_ID_2 Device_ID_1	
0 3/10 126 105 55VINC CIP	Device_ID_2 Device_channel	
startCMD3_CerabarM—	Com3_enable Com3_enable	

3.2.5.3 HART CMD 8: Read dynamic variable classifications (from HART6)







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3.2.5.4 HART CMD 14: Read primary variable sensor information

• HART CMD14 function block:

C	om_14_CerabarM	
enable_CMD	Com_14_Transducer_Info EN Com14_enable Information_res14 Module_ID_1 Module_ID_2 Device_ID_1 Device_ID_2 Device_ID_2 Device_channel ADDMX_string	 —resultCMD14_Cerabar
	9	•

3.2.5.5 HART CMD 15: Read primary variable output information

Co	m_15_CerabarM	
enable_CMD	Com_15_Read_PV_UF	RV_LRV ⁵ ENO —
Module_ID1_CerabarM— Module_ID2_CerabarM—	Module_ID_1 Write Module ID_2	_complete
Device_ID1_CerabarM— Device_ID2_CerabarM— 2	Device_ID_1 Device_ID_2	
'0.0.3{10.126.105.55}UNC.CIP'	ADDMX_string Com15_enable——Com1	15_enable —
200		

• HART CMD15 function block:

3.2.6 Animation Tables Configuration

Animation tables are used to display variables values in online mode. The following part explains how to configure an animation table for displaying relevant data.

• In the Project Browser, right-click on the menu "Animation Tables" and select the menu "New Animation Table":







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• Enter a name for the animation table and click on the button "OK":

Name:	Fun	ctional module:	
SE02_Cards	<n< th=""><th>one></th><th></th></n<>	one>	
Comment:			
			-
Extended String Animation			
Extended String Animation Number of animated characters:	100	(range: 20-30	0)
Extended String Animation Number of animated characters:	100	(range: 20-30	0)

- The created animation table is added in the Project Browser:
 Animation Tables
 Image: SE02_Cards
- Double-click on the animation table "SE02_Cards". Following window is displayed:



• Double-click in the field "Name "in order to display the button "...":

Modification	Force	¥ 4	F 🛛 😢	£	≭		۶	H	<u>به</u>	NG	मौ
Name	•	Value		Туре	8	÷.	Con	nment			
	· · · ·										

• Select for example following variables in the animation table and click on the button "OK":

Name = "					EDT 📃 D	DT 📃 IODDT 📗	Device DDT
ame	+	Туре	✓ Value	Com 🔻	Alias	Alias of	Addr 🔻
BMEP58_ECPU_EXT		T_BMEP58_ECPU_EXT					
EIO2_d1_r0_s0_CRA31200		T_M_CRA_EXT_IN					
X80_AHI_s1		T_BME_AHI_0812_Card1					
X80_AHI_s2		T_BME_AHI_0812_Card2					
X80_AHO_s1		T_BME_AHO_0412					
X80_Al1_s1		T_U_ANA_STD_IN_8					
X80_Al2_s2		T_U_ANA_STD_IN_8					
X80_AO_s3		T_U_ANA_STD_OUT_4					
		T_U_ANA_STD_OUT_4					



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• Selected variables are added in the animation table:

Modification Force	¥ £	1	£ ×		۶	₽]	<u>۶</u> ۱	मौ
Name	-	Value		Туре				•
				T_BME	_AHI_(0812	Card1	
🖻 🗐 X80_AHI_s2				T_BME	AHI_	0812	Card2	
🖻 🗐 X80_AHO_s1				T_BME	AHO	0412	2	
🖻 🗐 X80_Al1_s1				T_U_AN	A_ST	D_IN	_8	
🖪 🗐 X80_Al2_s2				T_U_AN	IA_ST	D_IN	_8	
🖻 🔵 X80_AO_s3				T_U_AN	IA_ST	D_O	UT_4	

• Another animation table can be configured for displaying HART Commands variables. In this example, the Animation Table is "SE02_HART_UniversalCommands":



• Corresponding animation table contains function blocks start bit and output values for the Universal Hart Commands:

Modification Force	5 2 5	* 🔳 🗲	1 🏄 🛃 🖻
Name 👻	Value	Туре 👻	Comment
startCMD0_CerabarM		BOOL	
Device_ID1_CerabarM		DWORD	9
Module_ID1_CerabarM		DWORD	9
Device_ID2_CerabarM		DWORD	9
Module_ID2_CerabarM		DWORD	9
🕀 🗾 ExtendedStatus_CMD0_CerabarM		Information_res00	9
startCMD3_CerabarM		BOOL	9
🕀 🗐 resultCMD3_CerabarM		Information_res3	9
startCMD8_CerabarM		BOOL	9
🕀 🚽 resultCMD8_CerabarM		Infomation_res8	9
startCMD14_CerabarM		BOOL	9
🕀 🔵 resultCMD14_CerabarM		Information_res14	9
startCMD15_CerabarM		BOOL	9
🖃 🗐 resultCMD15_CerabarM		Information_res15	9



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3.3 Commissioning of the Control Project

3.3.1 Project Settings

• Click on the menu "Tools→Project Settings":



• Select the menu "Variables" and then the option "Allow dynamic arrays". Then, click on the button "OK" to save:







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• Select the menu "Common" and then the option "Enable Implicit Data Conversion". Click on the button "OK" to save:

Project Settings				? 💌
Project Settings	^	Property label	Pro	perty value
🖻 General		Allow procedures	•	
 Management of build messages Build settings 		Allow subroutines		
- Project autosaving on download		Allow nested comments	Г	
- PLC embedded data		Allow multi assignment [a:=b:=c] (ST/LD)	Γ	
PLC diagnostics		Allow empty parameters in non-formal call (ST/IL)		
PLU behaviour		Usage of ST expressions (LD/FBD)	⊽	
Time		Maintain output links on disabled EF (EN=0)	Г	
Configuration		Display complete comments of structure element	Г	
Variables		Enable implicit type conversion		1
Program	=			-
Common - FBD - DD - FBD - FBD - SFC - SFC - SFC mult token - ST - Ll394 - View 1 - View 2 - View 4 - View 4 - Operator Screes	•	Implicit type conversion setting is applied for the pro LD.	ogram	ming languages ST, IL, FBD and
🚽 Import 📄 Export 🗙 Reset	All	ОК Арріу		Cancel Help

3.3.2 Project Compilation

• Select the menu "Build \rightarrow <u>Rebuild All Project"</u>:

File Edit View Services	Tools	Build PLC	Debug	Window
12 🚅 🖬 🎒 🖪 X f	n	A <u>n</u> alyze	Ctrl	l+Shift+B
	⇒ JL:	Analyze P	roject	
DTM Browser		Build Cha	nges Il Proiect	Ctrl+B

• Compilation is succesful:

Kack (\2.1 Rack (\2.1 Linking Process si	\0) BME XBP 0400} \0) BME XBP 0400} ucceeded : 0 Error(s) , 0		Generating Linking			
	Rebuild All Project (Import/exp	ort 入 User errors	À FDT log event) Search/Replace	



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3.3.3 Project Download in PLC

• Select the menu "PLC \rightarrow Connect" in the tool bar:

File Edit View	Services	Tools	Build	PLC Debug Window Help	
12 🖻 🖬 🎒	ii Pa X	8	5 0	<u>C</u> onnect	Ctrl+K
	141			S <mark>et <u>A</u>ddress</mark>	

• Once connected, select the menu "PLC→Transfer Project to PLC":

12 🖬 🖬 🚭	i i i i i i i i i i i i i i i i i i i	6 00	Disconnect	Ctrl+K
🐨 📥 🗂 🗖 🗖	0 -		Set <u>A</u> ddress	
			📅 Standard Mode 🎭 Simulation Mode	
			Compare	
			Transfer Project to PLC	Ctrl+L
			Transfer Project from PLC Transfer Project from Primary to	Ctrl+Shift+L StandBy PLC

• Following Message Box is displayed. Select the option "PLC Run after Transfer" if needed:

PC Project		Overwritten F	PLC Project	
Name:	Project	Name:	Project	
Version:	0.0.0	Version:	0.0.54	
Last Build:	24/01/2017 12:02:58	Last Build:	20/01/2017 15:16:59	
🔽 PLC Ru	n after Transfer			
	Transfer		Cancel	

• Following Message Box is displayed. Confirm by clicking on the button "OK:



• Following Message Box is displayed. Confirm by clicking on the button "OK":



The PLC is in run mode.
 HMI R/W mode EQUAL RUN UPLOAD INFO OK USB:SYS



3.3.4 Modules Freshness Verification

- After a program download or PLC reboot, the PLC acts as a DHCP server and distributes the IP addresses to the HART modules. Make sure that no other DHCP server is active on the same time on the network. Otherwise, the HART modules cannot be initialized with their IP addresses and all HART modules statuses LEDs are "OFF" except the "Error" LEDs which are blinking.
- Always check the HART modules Freshness bits after a program download or reboot. The ٠ corresponding IO structure name variable containing the Freshness bits is defined in chapter 3.2.4:

Name	 Value 	Type 🔻	Comment
∃ 	1	T BME AHI 0812 Card1	-
- Freshness	0	BOOL	Global Freshness
Freshness_1	0	BOOL	Freshness of Object
🗈 🗇 Inputs		T_BME_AHI_0812_Card1_IN	Input Variables
🗄 🗐 Outputs		T_BME_AHI_0812_Card1_OUT	Output Variables
🚊 🕣 X80_AHI_s2		T_BME_AHI_0812_Card2	3
🐤 Freshness	0	BOOL	Global Freshness
Freshness_1	0	BOOL	Freshness of Object
🗄 🗐 Inputs		T_BME_AHI_0812_Card2_IN	Input Variables
🗄 🗐 Outputs		T_BME_AHI_0812_Card2_OUT	Output Variables
🖃 🥏 X80_AHO_s3		T_BME_AHO_0412	8
🔶 Freshness	0	BOOL	Global Freshness
Freshness_1	0	BOOL	Freshness of Object
🕀 🗇 Inputs		T_BME_AHO_0412_IN	Input Variables
🕀 🗐 Outputs		T_BME_AHO_0412_OUT	Output Variables

Initialization with Errors (Ereshness = Ereshness 1 = 0).

In this example, another DHCP server was active and IO modules have not been successfully initialized. To fix this, disconnect the PLC from the supervisory network and wait few seconds for the HART modules initialization. Then reconnect the PLC to the supervisory network again.

Good Initialization (Freshness = Freshness 1 = 1): •

Modification Force	2 F 72	5 5 🗏 🕹 🗡 🖓 🔛	нĨ
Name	▼ Value	Туре 🔻	Comment
		T_BME_AHI_0812_Card1	
🐤 Freshness	1	BOOL	Global Freshness
🔶 Freshness_1	1	BOOL	Freshness of Object
🗄 🗂 Inputs		T_BME_AHI_0812_Card1_IN	Input Variables
🗄 🗐 Outputs		T_BME_AHI_0812_Card1_OUT	Output Variables
🖃 🗐 X80_AHI_s2		T_BME_AHI_0812_Card2	
	1	BOOL	Global Freshness
	1	BOOL	Freshness of Object
🗄 🗐 Inputs		T_BME_AHI_0812_Card2_IN	Input Variables
🗄 🗐 Outputs		T_BME_AHI_0812_Card2_OUT	Output Variables
🖻 🕖 X80_AHO_s3		T_BME_AHO_0412	
🔶 Freshness	1	BOOL	Global Freshness
🔶 Freshness_1	1	BOOL	Freshness of Object
🗄 🗐 Inputs		T_BME_AHO_0412_IN	Input Variables
🗄 🗂 Outputs		T_BME_AHO_0412_OUT	Output Variables

In this example, the initialization was successful and all modules are ready for use.





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3.4 Monitoring of Process Values and Status Information

3.4.1 Diagnostics via Web Browser

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



3.4.1.1 PLC & Network Diagnostics

- The M580 Standard Web page is displayed. This page Tag shows:
 - PLC status.

Home

- Version Info.
- Network configuration.

T lelll	M580 Standard Web
-9	BMEP582040

Status Summary

	RUN	ERR		1/0	CARD_ERR
				CARD_ACT	
	MOD STATUS	_	NETWORK STAT	US E	DOWN LOAD
Sei	rvice Status			Version Info)
V	DHCP Server	Enabled		Exec. Version	2.01
V	FDR Server	Enabled		Web Server Version	1.0
0	Access Control	Disabled		Web Site Version	2.01
V	Scanner Status	Working Prope	erly	CIP Version	1.0
0	NTP Status	Disabled			
FDRI	Usage	0.32%			
СР	U Summary			Network Info.	
Mode		BME 258 2040	n	IP Address	10.126.105.30
State		RUN		Subnet Address	255.255.252.0
Scan	Time	3 ms		Gateway Address	10.126.104.1
Logae	ed In	Yes		MAC Address	00 80 F4 11 3B C8
CPUI	Exec. Version	2.01		Host Name	BMEP582040
Unity	Program	Project			





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3.4.1.2 I/O Scanner

- Click on the Tag "Diagnostics" and select the menu "I/O Scanner". In this example, four devices have been scanned:
 - The CRA module with IP address <u>10.126.105.32</u>.
 - The AHI0812 module with IP address <u>10.126.105.55</u>.
 - The AHI0812 module with IP address <u>10.126.105.56</u>.
 - The AHO0412 module with IP address 10.126.105.57.

لطال M580 Stan	dard Web	
Home	agnostics	
Menu <	I/O Scanner	
Medule ~ Status Summary Performance	Scanner Status Connection Statistics Operational Total Transmissions Sent Number of Valid Connections Number of Valid Connections	6289081 2 4
Port Statistics	Scanned Device Statuses	
🖧 Connected Devices 🗸		
I/O Scanner Messaging		
සා Services 🗸		
QoS NTP		Ĺ
Redundancy System •	Not Configured 🚫 Unscanned 📈 Scanned	
Alarm Viewer		



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3.4.2 Animation Tables Monitoring

• Connect the PLC by clicking on the shortcut button:



• Double-click on the animation table "SE02_Cards":



3.4.2.1 Analog Input Data

• Expand for example the data structure "X80_AI_s2 for displaying all specific channel data for the second configured HART analog input module:

Name 👻	Value	Туре 👻	Comment
🕀 🛑 X80 AHI s1		T BME AHI 0812 Card1	
. Standard S		T BME AHI 0812 Card2	
X80 AHO s3		T BME AHO 0412	
. 🗩 X80 Al1 s1		T U ANA STD IN 8	
- 🗊 X80 Al2 s2		T U ANA STD IN 8	
MOD HEALTH	1	BOOL	Module health
MOD_FLT	0	BYTE	Module faults
ANA_CH_IN		ARRAY[07] OF T_U_ANA_STD_CH_IN	
ANA CH IN[0]		T U ANA STD CH IN	
- ANA CH_IN[1]		T U ANA STD CH IN	
FCT_TYPE	1	WORD	Function type
CH_HEALTH	1	BOOL	Channel health
CH_WARNING	0	BOOL	Channel warning
🖻 🖅 🗐 ANA		T_U_ANA_VALUE_IN	
VALUE	2565	INT	Analog input value
	0	INT	Forced value
	0	BOOL	Force command
FORCED_STATE	0	BOOL	Forced state
TRUE_VALUE	2565	INT	Physical value
MEASURE_STS	0	INT	Measurement status word
CH_ALIGNED	0	BOOL	Aligned channel
LOWER_LIMIT	0	BOOL	Measurement within lower tolerance zone
UPPER_LIMIT	0	BOOL	Measurement within upper tolerance zon
INT_OFFSET_ERROR	0	BOOL	Internal offset error
INT_REF_ERROR	0	BOOL	Internal reference error
POWER_SUP_ERROR	0	BOOL	Power supply error
SPI_COM_ERROR	0	BOOL	SPI communication error
ANA_CH_IN[2]		T_U_ANA_STD_CH_IN	
🗄 🗐 ANA_CH_IN[3]		T_U_ANA_STD_CH_IN	
👜 🗐 ANA_CH_IN[4]		T_U_ANA_STD_CH_IN	
👜 🗇 ANA_CH_IN[5]	0	T_U_ANA_STD_CH_IN	
🗄 🗇 ANA_CH_IN[6]		T_U_ANA_STD_CH_IN	
🗄 🗐 ANA_CH_IN[7]		T_U_ANA_STD_CH_IN	
- 🗩 X80 AO s3		T U ANA STD OUT 4	



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• Expand for example the data structure "X80_AHI_s2 for displaying all HART data per channel for the second configured HART analog input module:

Name 🔻	Value	Туре 🔻
⊡ X80 AHI s1		T BME AHI 0812 Card1
🗆 🛑 X80 AHI s2		T_BME_AHI_0812_Card2
	1	BOOL
Freshness_1	1	BOOL
📄 🗊 Inputs		T_BME_AHI_0812_Card2_IN
G_ModuleStatus	0	DWORD
🔶 G_ChannelStatus	16#0202_0202	DWORD
🔶 G_ChannelStatus2	16#0000_0002	DWORD B bytes status (1 byte per channel
P_Channel0_PV	468.7646	REAL
P_Channel0_SV	9.869323E+007	REAL
P_Channel0_TV	9.869323E+007	REAL
🔶 P_Channel0_QV	9.869323E+007	REAL
P_Channel1_PV	25.58331	REAL
P_Channel1_SV	26.32376	REAL HADT data for Ch1 (ITEMD TMT02)
P_Channel1_TV	25.58331	REAL RARI UALA IOI CITT (TEMP TWIOZ)
P Channel1 QV	25.58331	REAL
P Channel2 PV	-0.0886973	REAL
P_Channel2_SV	24.05051	REAL
P Channel2 TV	24.05051	REAL
P Channel2 QV	24.05051	REAL
P_Channel3_PV	100.069	REAL
P Channel3 SV	23.87759	REAL
P Channel3_TV	+NAN	REAL
P_Channel3_QV	+NAN	REAL
- S P Channel4 PV	99.81243	REAL
P Channel4 SV	0.1658593	REAL
P_Channel4_TV	-13.57978	REAL
P Channel4 QV	36.42754	REAL
P_Channel5_PV	+NAN	REAL
P_Channel5_SV	+NAN	REAL
P Channel5 TV	+NAN	REAL
P_Channel5_QV	+NAN	REAL
P Channel6 PV	+NAN	REAL
P Channel6 SV	+NAN	REAL
P_Channel6_TV	+NAN	REAL
P_Channel6_QV	+NAN	REAL
P_Channel7_PV	+NAN	REAL
P_Channel7_SV	+NAN	REAL
P_Channel7_TV	+NAN	REAL
P Channel7 QV	+NAN	REAL

• Each channel has its own status. In this example, all enabled channels (Ch0, Ch1, Ch2, Ch3 and Ch4) have the status value "0x02", this means that the channel is connected to the HART device. All disabled channels (Ch5, Ch6 and Ch7) have the status value "0x00".



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3.4.2.2 Analog Output Data

In this example, an AUMA actuator is connected on ChO of the analog output card. The target is to send a 4...20mA command to the AUMA actuator and to read back the feedback via the HART data.

• Expand for example the data structure "X80_AO_s3" for displaying all HART data per channel for the configured HART analog output module:

Modification Force	تد ک [تد ک	- 🖉 🔄 🗲 H 🖓 🔛	
Name	✓ Value	Туре 👻	Comment
		T_BME_AHI_0812_Card1	
. X80_AHI_s2		T_BME_AHI_0812_Card2	
. X80_AHO_s3		T_BME_AHO_0412	
		T_U_ANA_STD_IN_8	
		T_U_ANA_STD_IN_8	
🖨 🗐 🔀 🗛 🗛		T_U_ANA_STD_OUT_4	
MOD_HEALTH	1	BOOL	Module health
MOD_FLT	0	BYTE	Module faults
ANA_CH_OUT		ARRAY[03] OF T_U_ANA_STD_CH	
ANA_CH_OUT[0]		T_U_ANA_STD_CH_OUT	
FCT_TYPE	1	WORD	Function type
CH_HEALTH	1	BOOL	Channel health
🖻 🖅 🗊 ANA		T_U_ANA_VALUE_OUT	
🔶 VALUE	0	INT	Analog output value
FORCED_V	ALUE 0	INT	Forced value
FORCE_CM	ID 0	BOOL	Force command
FORCED_S	TATE 0	BOOL	Forced state
TRUE_VAL	UE 0	INT	Physical value
ANA_CH_OUT[1]		T_U_ANA_STD_CH_OUT	
ANA_CH_OUT[2]		T_U_ANA_STD_CH_OUT	
🖻 🗇 ANA_CH_OUT[3]	8	T_U_ANA_STD_CH_OUT	

• Click on the button "Modification" and enter a set point value in the field "FORCED_VALUE". This set point value is of course depending on the defined scaling range. In this example, the set point is 10% (Scaling Range is 0 to 100%):

Modification Force 2 5	E E Z	■ > 別 ② ■	
Name 👻	Value	Туре 👻	Comment
		T_BME_AHI_0812_Card1	
	9	T_BME_AHI_0812_Card2	
	2	T_BME_AHO_0412	
😟 🖅 X80_Al1_s1	3	T_U_ANA_STD_IN_8	
	2	T_U_ANA_STD_IN_8	
🖨 🗇 X80_AO_s3	2	T_U_ANA_STD_OUT_4	
MOD_HEALTH	1	BOOL	Module health
MOD_FLT	0	BYTE	Module faults
ANA_CH_OUT	2	ARRAY[03] OF T_U_ANA_STD_CH	
ANA_CH_OUT[0]	3	T_U_ANA_STD_CH_OUT	
FCT_TYPE	1	WORD	Function type
CH_HEALTH	1	BOOL	Channel health
🖻 – 🗊 ANA	2	T_U_ANA_VALUE_OUT	
VALUE	0	INT	Analog output value
FORCED_VALUE	1000	INT	Forced value
FORCE_CMD	0	BOOL	Force command
FORCED_STATE	0	BOOL	Forced state
TRUE_VALUE	0	INT	Physical value
ANA_CH_OUT[1]	2	T_U_ANA_STD_CH_OUT	
ANA_CH_OUT[2]	2	T_U_ANA_STD_CH_OUT	
ANA_CH_OUT[3]	2	T_U_ANA_STD_CH_OUT	



Modification Force 🔍 🝸	<u> 1</u> <u>1</u> <u>1</u>	🎟 🎽 🕅 🌗 🔜 📄	
Name 👻	Value	Type 🔹	Comment
⊞		T_BME_AHI_0812_Card1	
🗄 🗐 X80_AHI_s2	3	T_BME_AHI_0812_Card2	
🗄 🗐 X80_AHO_s3	9	T_BME_AHO_0412	
🗄 🗐 X80_Al1_s1	9	T_U_ANA_STD_IN_8	
🗄 🗐 X80_Al2_s2	9	T_U_ANA_STD_IN_8	
🖃 🔵 X80_AO_s3	9	T_U_ANA_STD_OUT_4	
MOD_HEALTH	1	BOOL	Module health
🗢 MOD_FLT	0	BYTE	Module faults
🖻 📕 ANA_CH_OUT	9	ARRAY[03] OF T_U_ANA_STD_CH	
ANA_CH_OUT[0]	9	T_U_ANA_STD_CH_OUT	
FCT_TYPE	1	WORD	Function type
CH_HEALTH	1	BOOL	Channel health
🖮 🗇 ANA	9	T_U_ANA_VALUE_OUT	
🐤 VALUE	1000	INT	Analog output valu
	1000	INT	Forced value
SFORCE_CMD	1	BOOL	Force command
STATE	1	BOOL	Forced state
TRUE_VALUE	1000	INT	Physical value
🗈 🗐 ANA_CH_OUT[1]	3	T_U_ANA_STD_CH_OUT	
🕀 🗊 ANA_CH_OUT[2]	3	T_U_ANA_STD_CH_OUT	
🗄 🗇 ANA_CH_OUT[3]	9	T_U_ANA_STD_CH_OUT	

• Send the set point by setting the bit "FORCE_CMD" to TRUE:

• Expand for example the data structure "X80_AHO_s3" for displaying all specific channel data for the configured HART analog output module on which is connected the AUMA actuator:

ame	▼ Value	Туре	 Comment
- 🗩 X80_AHI_s1		T_BME_AHI_0812_Card1	
- 🕖 X80_AHI_s2		T_BME_AHI_0812_Card2	
- 💋 X80_AHO_s3		T_BME_AHO_0412	
Freshness	1	BOOL	Global Freshness
	1	BOOL	Freshness of Object
inputs		T_BME_AHO_0412_IN	Input Variables
G ModuleStatus	3	DWORD	
G ChannelStatus	16#0505_0502	DWORD 🔶 4 bytes statu	is (1 byte per channel
P_Channel0_PV	9.9	REAL	is (1 byte per ename
P Channel0 SV	10.7	REAL LIADT data f	or ChO (ALINAA Actual
P Channel0_TV	0.0	REAL	or Chu (Auma Actua
P_Channel0_QV	0.0	REAL	
P_Channel1_PV	+NAN	REAL	
P_Channel1_SV	+NAN	REAL	
P_Channel1_TV	+NAN	REAL	
P Channel1_QV	+NAN	REAL	
P Channel2_PV	+NAN	REAL	
P_Channel2_SV	+NAN	REAL	
P_Channel2_TV	+NAN	REAL	
P_Channel2_QV	+NAN	REAL	
P_Channel3_PV	+NAN	REAL	
P_Channel3_SV	+NAN	REAL	
P_Channel3_TV	+NAN	REAL	
P_Channel3_QV	+NAN	REAL	
• Outputs		T_BME_AHO_0412_OUT	Output Variables
X80_Al1_s1		T_U_ANA_STD_IN_8	
X80_AI2_s2		T_U_ANA_STD_IN_8	
- 🗾 X80_AO_s3		T_U_ANA_STD_OUT_4	



• Each channel has its own status. In this example, all channels are enabled but only Ch0 is connected (ChannelStatus=0x02), this means that the channel is connected to the HART device. The other channels are enabled but no devices are connected (ChannelStatus=0x05).

In this example, the PV value "9.9" corresponds to the feedback value set point and the SV value "10.7%" corresponds to the real position of the actuator.

3.4.3 Monitoring of HART Process Variables and Commands

Sending HART Commands from the logic can be successfully executed if no other online connections are running in parallel on the same HART card, as via DTM in the DTM Browser or in FieldCare.

3.4.3.1 HART CMD 0: Read unique Identifier

• Function block HART CMD0 in online mode: The start bit "startCMD0 CerabarM" must be triggered twice:



3.4.3.2 HART CMD 3: Read dynamic variables and loop current

• Function block HART CMD3 in online mode: The start bit "startCMD3_CerabarM" is set to TRUE and must be set to FALSE manually:

25	2	5.	10	Name	Value	Туре 🔻
8%	×.	×.	¥1	enable_CMD	1	BOOL
•22	Com 2 Cor	abadu	<u>8</u>	startCMD3_CerabarM	1	BOOL
\$\$	<u>.com_s_cer</u>		*	resultCMD3_CerabarM		Information_res3
12	Com 3	Read variables <u>cu</u>	10	PV_loopcurrent	3.980576	REAL
N N N 1997 N	enable_CMD-EN	- ENO		PV_unit	'Bars'	STRING
• * *	0700700070	into_commanda	-resultCMD3_CerabarM	PV_value	-0.002427971	REAL
• * *	2726760972 Module_I	D_1 vvrite_complete		SV_unit	'Bars'	STRING
	2434371042 Device I			SV_value	-0.002435188	REAL
	239 Device I			- 🔷 TV_unit	'Bars'	STRING
	2 Device c	hanne		TV_value	-0.0003711804	REAL
0.0.3{10.126	.105.55 UNC. CIP' ADDMX s	tring		🔷 😔 QV_unit	'Deg C'	STRING
start	CMD3 CerabarM-Com3 en	abic Com3 enable		QV_value	25.16937	REAL
•			×.	Read_success	1	BOOL
$e_{i} \in e_{i} \in e_{i} \in e_{i}$	$(\mathbf{x}_{i}) \in \mathbf{x}_{i} = \mathbf{x}_{i} + \mathbf{x}_{i$	$(x_1, x_2, x_3, x_1, x_2, x_3, x_3, x_4, x_5, x_5, x_5, x_5, x_5, x_5, x_5, x_5$	a a a a a a a a a a a a a	Read fail	0	BOOL



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3.4.3.3 HART CMD 8: Read dynamic variable classifications (from HART6)

• Function block HART CMD8 in online mode:

The start bit "startCMD8_CerabarM" is set to TRUE and must be set to FALSE manually:

	Name	Value	lype 🔻
	enable_CMD	1	BOOL
Com 8 CerabarM	startCMD8_CerabarM	1	BOOL
3	😑 🕖 resultCMD8_CerabarM		Information_res8
Com_8_Read_Variable_Class	PV_Class_num	65	INT
enable_CMD—EN ENO	PV_Class	'Perssure'	STRING
Infomation_res8 —resultCMD8_CerabarM	SV_Class_num	65	INT
2726760972 Module_ID_1	SV_Class	'Perssure'	STRING
37-Module ID 2	TV_Class_num	65	INT
2434371042 Device ID 1	TV_Class	'Perssure'	STRING
239 Device ID 2	QV_Class_num	64	INT
2 Device channel	QV_Class	'Temperature'	STRING
0.0 3/10 126 105 55VINC CIP ADDMX string	Read_success	1	BOOL
state Constant Company Company company	Read_fail	0	BOOL
Como_enableComo_enableComo_enable			

3.4.3.4 HART CMD 14: Read primary variable sensor information

• Function block HART CMD14 in online mode: The start bit "startCMD14_CerabarM" is set to TRUE and must be set to FALSE manually:

Com_14_CerabarM	Name 👻	Value	Type 👻
	enable_CMD	1	BOOL
enable CMD_EN Com_14_Iransoucer_inro	startCMD14_CerabarM	1	BOOL
startCMD14 Corpharth Com14 analysis Information regultCMD14 CorphartM	🖃 🗐 resultCMD14_CerabarM		Information_res14
	Transducer_serial_num	9209613	DINT
2726760972 Module_ID_1	Spam_unit_code	7	INT
37—Module_ID_2	Spam_unit	'Bars'	STRING
2434371042 Device ID 1	Upper_limit	2.0	REAL
239 Device ID 2	- S Lower_limit	-1.0	REAL
2 Device channel	Minimum_spam	0.001994018	REAL
0.0.3(10.126.105.55)UNC CIP'-ADDMX_string	Read_success	1	BOOL
, abbilly_alling	A Read fail	0	BOOL

3.4.3.5 HART CMD 15: Read primary variable output information

• Function block HART CMD15 in online mode: The start bit "startCMD15_CerabarM" is set to TRUE and must be set to FALSE manually:

				Name 👻	Value	Туре	•
	Com 15 CerabarM			enable_CMD	1	BOOL	
		5	200 	startCMD15_CerabarM	1	BOOL	
	Com_15_Rea	d_PV_URV_LRV		E- 🔵 resultCMD15_CerabarM		Information_re	es15
	enable_CMD-EN	ENU		Alarm_HIGH	1	BOOL	
		Info_command15	-resultCMD15_CerabarM	Alarm_LOW	0	BOOL	
1	2726760972 Module_ID_1	Write_complete	<u>- 16</u> - 16	Alarm_HoldLastValue	0	BOOL	
*	37-Module_ID_2		<u>50</u>	Alarm_None	0	BOOL	
	2434371042 Device ID 1		*	Unit_code	'Bars'	STRING	
	239 Device ID 2			PV_UpperValue	2.0	REAL	
	2 Device channel		•	PV_LowerValue	0.0	REAL	
0 0 3(10 126	105 55 UNC CIP' ADDMX string			PV_damping	2.0	REAL	
ctart(CMD15 CerebarM Com15 onable	Com15 onablo		Write_protect	1	BOOL	
Start	Contra_Contra_enable	Contro_enable		PV_Unit	7	INT	
				Read_success	1	BOOL	
	· · ·	×.	•	A Read fail	0	BOOL	



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4 Advanced Integration

The Advanced Integration consists in using Endress+Hauser deviceDTMs in Unity Pro DTM Browser.

4.1 Device DTMs Library

- Install the Endress+Hauser HART DTM Library V2.44.00.
- Open the Hardware Catalog by clicking on the menu "Tools \rightarrow <u>H</u>ardware Catalog":

File Edit View	Services	Tools	Build	PLC	Debug	Window
12 🖻 🖬 🎒	100 %	✓ Pro	ject <u>B</u> ro	wser		Alt+1
Te da II B	Q -	<u>H</u> a	rdware (Catalog	J	Alt+2
	Do Iyp	Types Library Browser			Alt+3	
Host PC	Operator Screen Library			Alt+4		

• Click on the button "Update" to update the DTM catalog database:

- All devices		Device	Туре	Vendor	Version	Date
Device types	1	BME AHI 0812	Gateway	Schneider Electric	1.1.5.0	2016-06-20
Vendors	1	BME AHO 0412	Gateway	Schneider Electric	1.1.5.0	2016-06-20
Groups	6	BME CXM 0100 (H)	Gateway	Schneider Electric	1.0.000	2016-10-14
Protocols		BMEH582040 (from EDS)	Device	Schneider Electric	2.10	
		BMEH584040 (from EDS)	Device	Schneider Electric	2.10	
		BMEH586040 (from EDS)	Device	Schneider Electric	2.10	
	li i	BMENOC0301	Communication	Schneider Electric	2.6.21.0	2016-11-04
		BMENOC0301 (from EDS)	Device	Schneider Electric	1.1	
		BMENOC0301 Revision 2.2 (from EDS)	Device	Schneider Electric	2.4	
	li i	BMENOC0301_2	Communication	Schneider Electric	2.6.21.0	2016-11-04
	lă.	BMENOC0311	Communication	Schneider Electric	2.6.21.0	2016-11-04
		BMENOC0311 (from EDS)	Device	Schneider Electric	1.1	
		BMENOC0311 Revision 2.2 (from EDS)	Device	Schneider Electric	2.4	
		BMENOC0311 2	Communication	Schneider Electric	2.6.21.0	2016-11-04

 Following Message Box is displayed. Click on the button "Yes": Unity Pro XL

\bigcirc	The DTM	Catalog seems to b	e up of date.\Wo	ould you like t	to update it?
•					



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All devices		Device	Туре	Vendor	Version	Date
Device types	1	BME AHI 0812	Gateway	Schneider Electric	1.1.5.0	2016-06-2
Vendors	1	BME AHO 0412	Gateway	Schneider Electric	1.1.5.0	2016-06-2
Groups	100	Cerabar M / PMx 4x / V1.0 1.2	Device	Endress+Hauser	1.4.186	2016-05-1
Protocols	100	Cerabar M 5x / PMx 5x / V1.00.xx	Device	Endress+Hauser	1.4.186	2016-05-1
CANopen	100	Cerabar S / PMx 7x / HART / FW 2.20.zz / Dev.Rev. 22	Device	Endress+Hauser	1.4.186	2016-05-1
CDI	007	Cerabar S / PMx 7x / V02.10.xx	Device	Endress+Hauser	1.4.186	2016-05-1
CDI_TCPIP	100	iTEMP / TMT82 / HART / FW 1.00.zz / Dev.Rev. 1	Device	Endress+Hauser	1.4.186	2016-05-
CIP (EtherNet/IP)	60	ITEMP / TMT82 / HART / FW 1.01.zz / Dev.Rev 2	Device	Endress+Hauser	1.6.0.396	2015-05-2
HART	100	Liquiline M / CM44x / FW 1.02.zz / Dev.Rev. 1	Device	Endress+Hauser	1.4.186	2016-05-
Modbus over TCP Profibus DPV1	(3)	Micropilot / FMR5x / HART / FW 1.00.zz / Dev.Rev. 1	Device	Endress+Hauser	1.9.0.796	2016-11-
	60	Micropilot / FMR5x / HART / FW 1.01.zz / Dev.Rev. 2	Device	Endress+Hauser	1.9.0.802	2016-11-
	(3)	Micropilot / FMR5x / HART / FW 1.02.zz / Dev.Rev. 3	Device	Endress+Hauser	1.9.0.806	2016-11-
	007	Promag / 10 / V1.01.00	Device	Endress+Hauser	1.4.186	2016-05-
	1.1.7	Promag / 10 / V1.02.00	Device	Endress+Hauser	1.4.186	2016-05-
	100	Promag / 10 / V1.03.00	Device	Endress+Hauser	1.4.186	2016-05-
	100	Promag / 50 / HART / FW 2.04.zz / Dev.Rev. 9	Device	Endress+Hauser	1.4.186	2016-05-
	007	Promag / 50 / V2.03.xx	Device	Endress+Hauser	1.4.186	2016-05-
	(3)	Promag 400 / 5x4C / HART / FW 1.05.zz / Dev.Rev. 6	Device	Endress+Hauser	1.3.0.132	2014-05-
	687	Promag 400 / 5x4Cxx / HART / FW 1.04.zz / Dev.Rev. 5	Device	Endress+Hauser	1.0.0.32	2013-06-
	100	Prosonic M / FMU 4x / V2.00	Device	Endress+Hauser	1.4.186	2016-05-
	100	Prosonic M / FMU 4x / V4.xx	Device	Endress+Hauser	1.4.186	2016-05-
	107	Prosonic S / FMU 90 / V2.01.xx	Device	Endress+Hauser	1.4.186	2016-05-
	100	Prosonic S / FMU 9x / V01.00.xx	Device	Endress+Hauser	1.4.186	2016-05-
	007	Waterpilot 2x / FMX 21 / V1.00.xx	Device	Endress+Hauser	1.4.186	2016-05-

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

4.2 Field Device DTM

A new device can be added manually or by using the function "Fieldbus discovery".

4.2.1 New Field Device added Manually

 In the DTM Browser, right-click on the DTM "BME_AHI_0812_Card1" and select the menu "Add...":







• Select the DTM "Promag / 10 / V1.03.00" for this example and click on the button "AddDTM":

	Device	Туре	Vendor	Version	Date	
817	iTEMP / TMT82 / HART / FW 1	Device	Endress+Hauser	1.4.186.501	2016	
80	iTEMP / TMT82 / HART / FW 1	Device	Endress+Hauser	1.6.0.396	2015	
RH.	Liquiline M / CM44x / FW 1.02.zz	Device	Endress+Hauser	1.4.186.501	2016	
37	Micropilot / FMR5x / HART / FW	Device	Endress+Hauser	1.9.0.796	2016	11
-	Micropilot / FMR5x / HART / FW	Device	Endress+Hauser	1.9.0.802	2016	
-	Micropilot / FMR5x / HART / FW	Device	Endress+Hauser	1.9.0.806	2016	
107	Promag / 10 / V1.01.00	Device	Endress+Hauser	1.4.186.501	2016	
117	Promag / 10 / V1.02.00	Device	Endress+Hauser	1.4.186.501	2016	
37	Promag / 10 / V1.03.00	Device	Endress+Hauser	1.4.186.501	2016	
317	Promag / 50 / HART / FW 2.04.z	Device	Endress+Hauser	1.4.186.501	2016	
317	Promag / 50 / V2.03.xx	Device	Endress+Hauser	1.4.186.501	2016	E
-	Promag 400 / 5x4C / HART / F	Device	Endress+Hauser	1.3.0.132	2014	
-	Promag 400 / 5x4Cxx / HART / F	Device	Endress+Hauser	1.0.0.32	2013	
11	Prosonic M / FMU 4x / V2.00	Device	Endress+Hauser	1.4.186.501	2016	
817	Prosonic M / FMU 4x / V4 xx	Device	Endress+Hauser	1.4.186.501	2016	
117	Prosonic S / FMU 90 / V2.01 xx	Device	Endress+Hauser	1.4.186.501	2016	
817	Prosonic S / FMU 9x / V01.00.xx	Device	Endress+Hauser	1.4.186.501	2016	
10	Waterpilot 2x / FMX 21 / V1.00.xx	Device	Endress+Hauser	1.4.186.501	2016	
-				La des faces de la constance de		

• Select the channel on which is connected the device, "HART_Channel0" for this example and click on the button "OK":

Channel	Protocol
HART_Channel0	HART
HART_Channel1	HART
HART_Channel2	HABT
HART_Channel3	HABT
HART_Channel4	HABT
HART_Channel5	HABT
HART_Channel6	HART
HART_Channel7	HART
•	m

• Confirm by clicking on the button "Yes":

Modification Authorization	
Do you confirm the modification ?	
Yes No	





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• Default DTM name is displayed. Change it if needed and click on the button "OK". In this example the project DTM name is the default one:

operties	of device			— ×
General	Device information	DTM information	Protocol information	
DTM	name management			
Nam	e: Promag_1	0_V1_03_00		
		0		Hale
		Ur		пер

• The deviceDTM is successfully inserted in the DTM Browser:



- 4.2.2 New Field Device added with the FieldBus Scanner
 - Right-click on the DTM "BME_AHI_0812_Card1" and select the option "Connect":







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• Symbol indicates that the deviceDTM is successfully connected:



• Right-click on the deviceDTM and select the menu "Field bus discovery":



• Select the channel which has to be scanned and click on the button "OK". Channel 0 is selected in this example:

Channel	Protocol
HART_Channel0	HART
HART_Channel1	HART
HART_Channel2	HART
HART_Channel3	HART
HART_Channel4	HABT
HART_Channel5	HABT
HART_Channel6	HABT
HART_Channel7	HART
e	m

All channels cannot be selected for scanning all devices connected on the card.





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• Following window appears. The scanner founds the Promag10 and displays the matched DTMs:

Name		Channel		Address	Typeld	Vendor	Version	Serial			
PR(OMAG10	HART_Ch	annel0	0	69	17	1	49848	47		
latchec Name	DTMs		Match	Тира	Venc	lor	Versio		Date		
Pro	mag / 10.	/ V1 01 00	Uncerta	in devic	e Endr	ess+Haus	er 141	86 501	2016-05-11		
Proi	mag / 10.	/V1.02.00	Uncerta	in devic	e Endr	ess+Haus	er 1.4.1	86.501	2016-05-11		
😑 Pro	mag / 10 .	/ V1.03.00	Uncerta	in devid	e Endr	ess+Haus	er 1.4.1	86.501	2016-05-11		
	IDTU:									+	•
electec Name	Channel	Address	Match	Туре	Vendor	Version	Date				

• The correct deviceDTM revision must be selected manually. In this example, the deviceDTM "Promag / 10 /V1.03.00" is selected. Click on the shortcut button "Add the matched DTM":

11000	Channel	Ad	dress	Typeld	Vendor	Version	Serial		
PROMAG10	HART_Chan	nel0 0		69	17	1	49848	47	
latched DTMs Name	м	atch	Туре	Vend	or	Versio	n	Date	
1atched DTMs Name • Promag / 10	M 7 V1.01.00 U	atch ncertain	Type device	Vend Endre	or ess+Hause	Version 1.4.18	n 36.501	Date 2016-05-11	
fatched DTMs Name • Promag / 10 • Promag / 10	M 7 V1.01.00 U 7 V1.02.00 U	atch ncertain ncertain	Type device device	Vend Endre Endre	or ess+Hause ess+Hause	Version 1.4.18 1.4.18	n 36.501 36.501	Date 2016-05-11 2016-05-11	
fatched DTMs Name Promag / 10 Promag / 10 Promag / 10	M /V1.01.00 U /V1.02.00 U /V1.03.00 U	atch ncertain ncertain ncertain	Type device device device	Vend e Endre e Endre e Endre	or ess+Hause ess+Hause ess+Hause	Version 1.4.18 1.4.18 1.4.18	n 36.501 36.501 36.501	Date 2016-05-11 2016-05-11 2016-05-11	


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• Click on the button "OK" to close the window:

Name Channel	A	ddress	Typeld	Vendor	Version	Serial			
PROMAG10 HART_C	hannelO O		69	17	1	49848	147		
1atched DTMs									
Name	Match	Туре	Vendo	or	Versio	n	Date		
 Promag / 10 / V1.01.00 Promag / 10 / V1.02.00 Promag / 10 / V1.02.00) Uncertain) Uncertain	devic devic	e Endre e Endre	ss+Hause ss+Hause	er 1.4.1 er 1.4.1	86.501 86.501	2016-05-11 2016-05-11		
								Ŧ	
ielected DTMs	Channel		Address	Match	Tun	e Ve	ndor	Versio	n
Promag / 10 / V1.03.00) HART_CH	iannel0	0	Uncerl	ain dev	ice Er	ndress+Hauser	1.4.18	36.50

• The deviceDTM is successfully inserted in the DTM Browser:



- 4.3 Data Execution Prevention Option
 - Errors may occur by trying to connect some Endress+Hauser deviceDTMs in Unity Pro 11.1 Frame:



The workaround to avoid this issue consists in disabling the Windows Data Execution Prevention (DEP) option on the engineering station, on which is installed Unity Pro.



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Steps to proceed:

• Open the MS DOS Command Prompt, write the command "bcdedit" and click on "Enter":



• This displays the Windows Boot Manager and Loader settings:



- Check the parameter "nx".
 If its state is "OptIn", write following command and click on "Enter":
 C:\Users\testadmin bcdedit/set {current} nx AlwaysOff
- This changes the state to "AlwaysOff":



• Reboot the Engineering station.



4.4 HART Analog Input Module Online Connection

• Before connecting the HART module comDTM and deviceDTMs, make sure that all HART function blocks are deactivated in the program. Please refer to chapter 3.2.5.1.

C	m_0_module_CerabarM	10
÷	Com O modulo dovico	2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 - 2000 -
enable_CMD-	EN ENO	and the second
0	Module_polling_add Module_ID_1 -2726	760972
- 2—	Device_channel Module_ID_2	
· 0—	Device_polling_add Device_ID_1 -2434	371042 · · · · ·
÷	Device_ID_2 -239	Sector 1. Constraints and the sector of the
'0.0.3{10.126.105.55}UNC.CIP'-	ADDMX_String1 Extend_device_status —exter	idedStatus_CMD0_CerabarM
startCMD0_CerabarM—	Com_0_enCom_0_en	•
		2 C C C C C C C C C C C C C C C C C C C

• Right-click on the DTM "BME_AHI_0812" and select the menu "Open":



 Select the menu "Address Table". This menu displays the devices whose deviceDTM is configured in the DTM Browser. If needed, click on the button "Rescan" to refresh.
 In this example, the "Matched State" is equal. That means the device ID and vender ID in the

In this example, the "Matched State" is equal. That means the device ID and vendor ID in the project match the online values of the device:

1	Module Overview	Channel	Matched State	Device Name	Version	Vendor	Date	
	Address Table	1010	_		100000000000000000	201000000000000000000000000000000000000		
	General Information	U	_	PROMAG_1	1.4.186.501	Endress+Hauser	2016-05-11	
	Host Communication Status	1						
	Instrument Status							
	Multiplexer Status							
	Process Data							
÷	Configuration							
	NOTE CON- NORMAL CONTRACTOR							



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• Select the menu "Instrument Status". This menu displays all connected devices of the card as well as the HART Data if these one are enabled (See Chapter 3.1.5.1) and if the Multiplexer Scanning option is enabled:

	s & Hauser PROMAG10 s & Hauser PROMAG50	4C100F		Conferentian Channel	1000			
1 Endres	s & Hauser PROMAG50			Configuration Changed			Appeared	V
- 2 17		4C1038	Normal	Configuration Changed	1283	0	Appeared	
	25	8DE2EF	Nomal	Configuration Changed	1351	0	Appeared	V
- 3 Endres	s & Hauser FMU9x	012FC4	Normal	0xD0Multiple Errors	1332	0	Appeared	V
4 17	156	F0FA08	Normal	Configuration Changed	1324	0	Appeared	V
Reset	/		m					•
	Chanala	Channel d	channel 2	Channel D	Channel 4	Channel	l.r.	Channel C
Loop Current	4 0000 mA	5 8907 mA	2 9812 mA 2	2 0000 mA 12	5976 mA	Channe	815	Channel 6
PV	0.0000 I/min	2 9008	-0.0023 bar 1	9.6328 % 14	6 9000 mV			
- SV	0.0000 liter	21223.5293	-0.0023 bar 8	.0956 m 14	6.9000 mV			
- TV	0.0000 not used	0.0000 not used	-0.0003 bar 24	4.5763 deg C 23	.8900 deg C			
QV	0.0000 not used	0.0000 not used	24.6678 bar 1	9.6329 deg C 4.	4276 deg C			
٠ [m					•
					ОК	Cancel	Appl	у 🤇
	< <p>Reset Loop Current PV SV TV QV</p>	Reset Channel 0 Loop Current 4.0000 mA PV 0.0000 l/min SV 0.0000 liter TV 0.0000 liter QV 0.0000 not used	Reset Channel 0 Channel 1 Loop Current 4 0000 mA 5 8907 mA PV 0 00000 l/min 2 9008 SV 0 00000 leter 21223.5293 TV 0 00000 not used 0 0000 not used QV 0 0000 not used 0 0000 not used	Channel 0 Channel 1 Channel 2 Loop Current 4 0000 mA 5.8907 mA 3.9812 mA 2 PV 0.0000 l/min 2 9008 -0.0023 bar 1 SV 0.0000 l/min 2 9008 -0.0023 bar 8 TV 0.0000 lnet 21223.5293 -0.0023 bar 2 QV 0.0000 not used 0.0000 not used -0.0030 bar 2 QV 0.0000 not used 0.0000 not used -0.003 bar 1	Channel 0 Channel 1 Channel 2 Channel 3 Loop Current 4 40000 mA 58907 mA 3 9912 mA 220000 mA 12 PV 0.0000 l/min 29008 -0.0023 bar 19.6328 % 14 SV 0.0000 ler 21223.523 -0.0023 bar 24.5763 deg C 22 QV 0.0000 not used 0.0000 not used 0.0000 not used 19.6329 deg C 4.	Image: Channel 0 Channel 1 Channel 2 Channel 3 Channel 4 Loop Current 40000 mA 5/8907 mA 3/9812 mA 22/0000 mA 12/5876 mA PV 0.0000 liter 2/9008 -0.0023 bar 19/6328 % 146/900 mV SV 0.0000 liter 2/1223.5293 -0.0023 bar 24/5763 deg C 23/8900 deg C V 0.0000 not used 0.0000 not used 0.0000 not used 24/6678 bar 19/6329 deg C 4/4276 deg C	Image: Construction of the second s	Channel 0 Channel 1 Channel 2 Channel 3 Channel 4 Channel 5 Loop Current 40000 mA 58907 mA 39812 mA 220000 mA 125876 mA T PV 0.0000 liter 29008 0.0023 bar 19 6328 % 146 5000 mV T SV 0.0000 liter 21223.523 -0.0023 bar 24.5763 deg C 23.8900 deg C T TV 0.0000 not used 0.0003 bar 24.5763 deg C 23.8900 deg C T QV 0.0000 not used 0.0000 not used 19 6329 deg C 4.4276 deg C T

• Select the menu "Instrument Status". This menu allows the user to configure the HART PORT Parameters. In this example, the option "Scanning" is enabled:

Module Overview	HART PORT Parameters		Status
 Address Table General Information 	Scan Command	Read Current(mA), PV, 🔻	Device Malfunction
Host Communication Status	Scanning	ON 🔻	Configuration Changed Reset
Multiplexer Status Process Data	Communication Retry Count	0	Cold Start
Configuration	Busy Retry Count	0	More Status Available
	Gender	Primary -	
	Search Algorithm	Poll Address 0 Only	
	Max Instruments Connected	8	
	Instrument on Instruments List	5	
	Perform following comma Store data to device	and after apply:	





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4.5 DeviceDTM Online Connection

• Right-click on the deviceDTM "Promag_10_V1_03_00" and select the menu "Connect":



• The DeviceDTM "Promag_10_V1_03_00" is now connected:



 Double-click on the deviceDTM "Promag_10_V1_03_00": The Online connection is established. Device parameters can be accessed:





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5 Specific Integration

This chapter explains how to handle device specific HART commands over Ethernet IP from the control strategy.

To evaluate and document the workflow, we have implemented this by example for reading and resetting the totalizer of a Promag50 device. Further device specific HART Commands may be implemented based on this concept.

The Promag50 is connected to the HART analog input card AHI0812 Channel 1 of the X80 Remote IO Station.

5.1 Principle

Sending HART Commands over Ethernet IP is possible by using the function block "DATA_EXCH".

Two Device Specific function blocks for the Promag50 have been developed by using the "DATA_EXCH" function block in combination with the Universal HART CMD0 function block "Com_0_module_device" of the library "ex80_hart_generic_dfb.xdb":

The function block "readTotalizer1_Promag50" is used to read the Totalizer1 value.

The function block "resetTotalizer1_Promag50 is used to reset the Totalizer1 value.

5.1.1 General Workflow

The sequence for sending/receiving Device Specific HART Commands over Ethernet IP has four main steps in our example:

- Step 1: Get module and device ID
 - Command 0 is sent on the HART module's channel on which the device is connected in order to get the module ID and the device ID.
- Step 2: Request telegram configuration
 - Request telegram of the "DATA_EXCH" function block is prepared (see chapter 5.1.2).
- Step 3: Function block "DATA_EXCH" enabling
 - The function block "DATA_EXCH" can be enabled.
- Step 4: Response telegram decoding
 - Received data can be decoded (see chapter 5.1.3).



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5.1.2 Request Telegram

The request telegram of the function block "DATA_EXCH" sent from the M580 PLC to the HART device is composed of one Ethernet IP part and two HART parts, one specific for communicating with the HART Module (via Command 155) and another one specific for communicating with the HART device (via Command 174/Command175).

Request Telegram		
Part 1	Part 2	Part 3
Header Ethernet IP	HART Command to HART Module	HART Command to HART Device

Following device specific data need to be implemented in the Request Telegram of the function block "DATA_EXCH" (Part3):

- Specific HART Data for Command 174 Read Totalizer 1: Request data (3 bytes): 0x07 0x6E 0x01
- Specific HART Data for Command 175 Reset Totalizer 1: Request data (5 bytes): 0x07 0x6B 0x01 0xFB 0x01



5.1.2.1 Complete Request Telegram for Device Specific Command 174

The following table displays the 40 bytes request telegram for the device specific Command 174 in order to read the value of Totalizer1. This telegram is specific for the used Module and device in our example.

Request Frame	Offset	Value	Comment
	Byte 0	0x4B	Explicit Message Service
	Byte 1	0x03	Request path size
	Byte 2	0x21	
Part1	Byte 3	0x00	
Header Ethernet IP	Byte 4	0x10	- Description of the
	Byte 5	0x04	Request path
	Byte 6	0x24	
	Byte 7	0x01	
	Byte 8	0xFF	
	Byte 9	0xFF	
	Byte 10	0xFF	Preambles
	Byte 11	0xFF	
	Byte 12	0xFF	
	Byte 13	0x82	Delimiter
Part2	Byte 14	0xA2	
HART Command	Byte 15	0x87	
to HART Modulelin	Byte 16	0x12	Module ID
	Byte 17	0x0C	
	Byte 18	0x25	
	Byte 19	0x9B	Command 155
	Byte 20	0x12	Data length (from Byte 21 to 38)
	Byte 21	0x01	HART Channel Number
	Byte 22	0xFF	
	Byte 23	0xFF	
	Byte 24	0xFF	Preambles
	Byte 25	0xFF	
	Byte 26	0xFF	
	Byte 27	0x82	Delimiter
	Byte 28	0x91	
Part3	Byte 29	0x41	
HART Command	Byte 30	0x4C	Device ID
to Device	Byte 31	0x10	
	Byte 32	0x38	
	Byte 33	0xAE	Device Specific Command 174
	Byte 34	0x03	Device Specific data length (from Byte 35 to 37)
	Byte 35	0x07	
	Byte 36	0x6E	Device Specific request data
	Byte 37	0x01	
	Byte 38	0xF3	Checksum Command 174 (from Byte 27 to 37)
	Byte 39	0xEB	Checksum Command 155 (from Byte 13 to 38)



5.1.2.2 Complete Request Telegram for Device Specific Command 175

The following table displays the 42 bytes request telegram for the device specific Command 175 in order to reset the value of Totalizer1. This telegram is specific for the used Module and device in our example.

Request Frame	Offset	Value	Comment
	Byte 0	0x4B	Explicit Message Service
	Byte 1	0x03	Request path size
	Byte 2	0x21	
Part1	Byte 3	0x00	
Header Ethernet IP	Byte 4	0x10	Dequest noth
	Byte 5	0x04	Request path
	Byte 6	0x24	
	Byte 7	0x01	
	Byte 8	0xFF	
	Byte 9	0xFF	
	Byte 10	0xFF	Preambles
	Byte 11	0xFF	
	Byte 12	0xFF	
	Byte 13	0x82	Delimiter
Partz	Byte 14	0xA2	
HART Command	Byte 15	0x87	
to HART Module	Byte 16	0x12	Module ID
	Byte 17	0x0C	
	Byte 18	0x25	
	Byte 19	0x9B	Command 155
	Byte 20	0x12	Data length (from Byte 21 to 38)
	Byte 21	0x01	HART Channel Number
	Byte 22	0xFF	
	Byte 23	0xFF	
	Byte 24	0xFF	Preambles
	Byte 25	0xFF	
	Byte 26	0xFF	
	Byte 27	0x82	Delimiter
	Byte 28	0x91	
	Byte 29	0x51	
Part3	Byte 30	0xA2	Device ID
HART Command	Byte 31	0x2F	
to Device	Byte 32	0x74	
	Byte 33	0xAF	Device Specific Command 175
	Byte 34	0x05	Device Specific data length (from Byte 35 to 37)
	Byte 35	0x07	
	Byte 36	0x6B	1
	Byte 37	0x01	Device Specific request data
	Byte 38	0xFB	1
	Byte 39	0x01	1
	Byte 40	0x86	Checksum Command 175 (from Byte 27 to 39)
	Byte 42	0xEC	Checksum Command 155 (from Byte 27 to 40)



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5.1.3 Response Telegram

The response telegram of the function block "DATA_EXCH" received from the HART device on the M580 PLC is composed of one Ethernet IP part and two HART parts, one specific for with the HART Module (via Command 155) and another one specific for the HART device (via Command 174/Command175).

Response Telegram		
Part 1	Part 2	Part 3
Header Ethernet IP	HART Command to HART Module	HART Command to HART Device

Following device specific data are received in the Response Telegram of the function block "DATA_EXCH" (Part3):

- Specific HART Data for Command 174 Read Totalizer 1: Response data (8 bytes): 0x07 0x6E 0x01 0xFB + 4 bytes data
- Specific HART Data for Command 175 Reset Totalizer 1: Response data (5 Bytes): 0x07 0x6B 0x01 0xFB 0x01



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5.1.3.1 Complete Response Telegram for Device Specific Command 174

The following table displays a 40 bytes response telegram for the device specific Command 174. This telegram is specific for the used Module and device in our example.

Request Frame	Offset	Value	Comment
	Byte 0	0xCB	
Part1	Byte 1	0x00	Explicit Message Service
Header Ethernet IP	Byte 2	0x00	
	Byte 3	0x00	
	Byte 4	0xFF	
	Byte 5	0xFF	
	Byte 6	0xFF	Preambles
	Byte 7	0xFF	
	Byte 8	0xFF	
	Byte 9	0x86	Delimiter
	Byte 10	0xA2	
Part2	Byte 11	0x87	
	Byte 12	0x12	Module ID
to HART Module	Byte 13	0x0C	
	Byte 14	0x25	
	Byte 15	0x9B	Command 155
	Byte 16	0x16	Data length (from Byte 17 to 38)
	Byte 17	0x00	Communication Status (HART Specification 99)
	Byte 18	0x50	Device Status (HART Specification 99)
	Byte 19	0x01	HART Channel Number
	Byte 20	0x86	Delimiter
	Byte 21	0x91	
	Byte 22	0x41	
	Byte 23	0x4C	Device ID
	Byte 24	0x10	
	Byte 25	0x38	
	Byte 26	0xAE	Device Specific Command 174
	Byte 27	0x0A	Device Specific data length (from Byte 28 to 37)
Part3	Byte 28	0x00	Communication Status (HART Specification 99)
HART Command	Byte 29	0x40	Device Status (HART Specification 99)
to Device	Byte 30	0x07	
	Byte 31	0x6E	
	Byte 32	0x01	HART Specific Response
	Byte 33	0xFB	
	Byte 34	0x41	
	Byte 35	0xBD	
	Byte 36	0x37	i otalizer 1 value
	Byte 37	0xF4	1
	Byte 38	0x2E	Checksum Command 174 (from Byte 27 to 37)
	Byte 39	0x63	Checksum Command 155 (from Byte 13 to 38)



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5.1.3.2 Complete Response Telegram for Device Specific Command 175

The following table displays the 37 bytes response telegram for the device specific Command 175. This telegram is specific for the used Module and device in our example.

Request Frame	Offset	Value	Comment				
	Byte 0	0xCB					
Part1	Byte 1	0x00	Explicit Message Service				
Header Ethernet IP	Byte 2	0x00					
	Byte 3	0x00					
	Byte 4	0xFF					
	Byte 5	0xFF					
	Byte 6	0xFF	Preambles				
	Byte 7	0xFF					
	Byte 8	0xFF					
	Byte 9	0x86	Delimiter				
D- #2	Byte 10	0xA2					
Partz	Byte 11	0x87					
HART Command	Byte 12	0x12	Module ID				
to HART Module	Byte 13	0x0C					
	Byte 14	0x25]				
	Byte 15	0x9B	Command 155				
	Byte 16	0x13	Data length (from Byte 17 to 35)				
	Byte 17	0x00	Communication Status (HART Specification 99)				
	Byte 18	0x50	Device Status (HART Specification 99)				
	Byte 19	0x01	HART Channel Number				
	Byte 20	0x86	Delimiter				
	Byte 21	0x91					
	Byte 22	0x41					
	Byte 23	0x4C	Device ID				
	Byte 24	0x10					
	Byte 25	0x38					
Dort 2	Byte 26	0xAF	Device Specific Command 175				
HAPT Command	Byte 27	0x07	Device Specific data length (from Byte 28 to 34)				
to Device	Byte 28	0x00	Communication Status (HART Specification 99)				
	Byte 29	0x40	Device Status (HART Specification 99)				
	Byte 30	0x07					
	Byte 31	0x6B					
	Byte 32	0x01	HART Specific Response				
	Byte 33	0xFB					
	Byte 34	0x01					
	Byte 35	0x4D	Checksum Command 175 (from Byte 20 to 34)				
	Byte 36	0x41	Checksum Command 155 (from Byte 9 to 35)				



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5.2 Function Block "readTotalizer1_Promag50"

• The function block has been created in the "Derived FB Types" library and is composed of 5 sections:



• Section "command0"

This part is handling the HART command 0 function block:

- The first part is configuring the Command 0 input "ADDMX_String1".
- The second part is handling the Command 0 input "Com_0_en" in order to execute the function block only one time.
- The third part is the Command 0 function block configuration.







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```
Section "requestFrame"
.
       This part is handling the input request table of the function Block "DATA EXCH" as described in
       Chapter 5.1.2.1:
       (*Command 174: Request Telegram "Read Totaliser1 Value"*)
request_CMD174[0]:= 16#034B;
request_CMD174[1]:= 16#0021;
request_CMD174[2]:= 16#0410;
request_CMD174[3]:= 16#0124;
request_CMD174[3]:= 16#0124;
       request_CMD174[4] := 16#FFFF;
request_CMD174[5] := 16#FFFF;
       request_CMD174[6]:= 16#FFFF;
request_CMD174[6]:= 16#82FF;
request_CMD174[7]:=DWORD_TO_INT(ROR((moduleID1 AND 16#00FF_0000),8)) + DWORD_TO_INT(ROR((moduleID1 AND 16#FF00_0000),24));
request_CMD174[8]:=DWORD_TO_INT(ROL((moduleID1 AND 16#0000_00FF),8)) + DWORD_TO_INT(ROR((moduleID1 AND 16#0000_FF00),8));
request_CMD174[9]:=DWORD_TO_INT((moduleID2 AND 16#0000_00FF)) + 16#9B00;
       tempChannel:=SHL(deviceChannel,8);
       tempCnanne1:=SHL(deviceChanne1, b);
request_CMD174[10]:= tempChanne1+ 16#0012;
request_CMD174[11]:= 16#FFFF;
request_CMD174[12]:= 16#FFFF;
request_CMD174[13]:= 16#82FF;
       request_CMD174[14]:=DWORD_TO_INT(ROR((deviceID1 AND 16#FF00_0000),24)) + DWORD_TO_INT(ROR((deviceID1 AND 16#00FF_0000),8));
request_CMD174[15]:=DWORD_TO_INT(ROR((deviceID1 AND 16#0000_FF00),8)) + DWORD_TO_INT(ROL((deviceID1 AND 16#0000_00FF),8));
request_CMD174[16]:=DWORD_TO_INT((deviceID2 AND 16#0000_00FF)) + 16#AE00;
request_CMD174[17]:= 16#0703;
request_CMD174[18]:= 16#016E;
          Checksum 1 Command 174: Request Telegram "Read Totaliser1 Value"*
       if ((moduleID1>0 AND moduleID2>0 AND deviceID1>0 AND deviceID2>0 ) AND (NOT enableChecksumCMD174)) THEN FOR offset:=13 to 17 BY 1 D0
                 checksumCMD174:= checksumCMD174 XOR (SHR(request CMD174[offset],8) XOR request CMD174[offset+1]);
            END_FOR;
            checksumCMD174:=checksumCMD174 XOR SHR (request CMD174[offset],8);
            request_CMD174[19]:= checksumCMD174;
enableChecksumCMD174:= TRUE;
            enableChecksumCMD174_CMD155:= TRUE;
       END_IF;
       END_FOR;
            tempRegCMD174:=SHL(checksumCMD174 155,8);
            request_CMD174[19]:=request_CMD174[19] + tempRegCMD174;
enableChecksumCMD174_CMD155:= FALSE;
       END_IF;
```

• Section "dataExchange":

This section is handling the configuration of the function block "DATA EXCH":







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• Section "statusHandling"

This section is handling the main errors status of the Ethernet IP communication as well as the HART communication status:

```
(*HART Communication Status Bytes received on Byte 17 and Byte 18*)
moduleStatusByte1:=SHR(receivedData_CMD174[8],8);
moduleStatusByte2:=receivedData_CMD174[9];
(*HART Communication Status Bytes received on Byte 28 and Byte 29*)
deviceStatusByte1:=receivedData_CMD174[14];
deviceStatusByte2:=SHR(receivedData_CMD174[14],8);
(*Error EIP*)
IF(receivedData_CMD174[01]=16#0D80 or receivedData_CMD174[01]=16#1280
or receivedData_CMD174[01]=16#1580 or receivedData_CMD174[01]=16#3080) THEN
errorEIP:=TRUE;
statusEIP:=receivedData_CMD174[01];
else
errorEIP:=FALSE;
statusEIP:=receivedData_CMD174[01];
END IF;
```

5.3 Function Block "resetTotalizer1_Promag50"

• The function block has been created in the "Derived FB Types" library and is composed of 5 parts:



Section "command0"

This part is based on the same principle as done for the section "command0" of the function block "readTotalizer1_Promag50".





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```
Section "requestFrame"
.
           This part is handling the input request table of the function Block "DATA EXCH" as described in
            Chapter 5.1.2.2:
           ClidpleT 5.1.2.2.
[*Command 175: Request Telegram "Reset Totaliser1 Value"*)
request_CMD175[0]:= 16#034B;
request_CMD175[1]:= 16#0021;
request_CMD175[2]:= 16#0410;
request_CMD175[3]:= 16#010;
request_CMD175[3]:= 16#0124;
request_CMD175[5]:= 16#FFFF;
request_CMD175[6]:= 16#82FF;
request_CMD175[6]:= 16#82FF;
request_CMD175[7]:=DWORD_TO_INT(ROR((moduleID1 AND 16#00FF_0000),8)) + DWORD_TO_INT(ROR((moduleID1 AND 16#FF00_0000),24));
request_CMD175[8]:=DWORD_TO_INT(ROR((moduleID1 AND 16#0000_00FF),8)) + DWORD_TO_INT(ROR((moduleID1 AND 16#FF00_0000),24));
request_CMD175[9]:=DWORD_TO_INT(ROL((moduleID1 AND 16#0000_00FF),8)) + DWORD_TO_INT(ROR((moduleID1 AND 16#0000_FF00),8));
request_CMD175[9]:=DWORD_TO_INT((moduleID2 AND 16#0000_00FF)) + 16#9B00;
tempChannel:=SBL(deviceChannel,8);
          request_CMD175[9]:=DWORD_TO_INT((moduleID2 AND 16#0000_00FF)) + 16#9B00;
tempChanne1:=SHL(deviceChannel,8);
request_CMD175[10]:= tempChannel + 16#0014;
request_CMD175[11]:= 16#FFFF;
request_CMD175[12]:= 16#FFFF;
request_CMD175[14]:=D00RD_TO_INT(ROR((deviceID1 AND 16#FF00_0000),24)) + DWORD_TO_INT(ROR((deviceID1 AND 16#00FF_0000),8));
request_CMD175[14]:=DWORD_TO_INT(ROR((deviceID1 AND 16#0000_FF00),8)) + DWORD_TO_INT(ROR((deviceID1 AND 16#00FF_0000),8));
request_CMD175[15]:=DWORD_TO_INT(ROR((deviceID1 AND 16#0000_FF00),8)) + DWORD_TO_INT(ROL((deviceID1 AND 16#0000_00FF),8));
request_CMD175[16]:=DWORD_TO_INT((deviceID2 AND 16#0000_00FF)) + 16#AF00;
request_CMD175[17]:= 16#0705;
request_CMD175[18]:= 16#016B;
request_CMD175[19]:= 16#01FB;
            (*Checksum 1 Command 175: Request Telegram "Reset Totaliser1 Value"*)
if ((moduleID1>0 AND moduleID2>0 AND deviceID1>0 AND deviceID2>0 ) AND (NOT enableChecksumCMD175)) THEN
FOR offset:=13 to 18 BY 1 DC
                          checksumCMD175:= checksumCMD175 XOR (SHR (request CMD175[offset], 8) XOR request CMD175[offset+1]);
                   END_FOR;
                   checksumCMD175:=checksumCMD175 XOR SHR(request_CMD175[offset],8);
                   request_CMD175[20] := checksumCMD175;
enableChecksumCMD175:= TRUE;
                    enableChecksumCMD175_CMD155:= TRUE;
            END_IF;
             (*Checksum 2 Command 175: Request Telegram "Reset Totaliser1 Value"*)
            if enableChecksumCMD175_CMD155_THEN
FOR offset:=6 to 19 BY 1 D0
    checksumCMD175_155:= checksumCMD175_155 XOR (SHR(request_CMD175[offset],8) XOR request_CMD175[offset+1]);
                   END FOR;
                   tempRegCMD175:=SHL(checksumCMD175_155,8);
request_CMD175[20]:=request_CMD175[20] + tempRegCMD175;
enableChecksumCMD175_CMD155:= FALSE;
            END IF;
```

Section "dataExchange"

This part is based on the same principle as done for the section "dataExchange" of the function block "readTotalizer1_Promag50".

• Section "receivedDataConversion"

• Section "statusHandling"

This part is based on the same principle as done for the section "statusHandling" of the function block "readTotalizer1_Promag50".





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5.4 Program

• In the Project Browser, a new section "deviceSpecificCommand_Promag50" is created for this example:



5.4.1 Function Block "readTotalizer1_Promag50" Configuration

• Create following variables:

ariables	DDT Types	Functi	on Blocks	DFB T	ypes
Filter	T 🖏	Nan	ne = -		
Name		•	Туре	•	Value
; 🔶 e	enable_CMD		BOOL		
···· 😏 ۱	alueTOT1		REAL		
- 🔶 s	tartRead_Ch1	2	BOOL		

Assign all required variables to the function block "readTotalizer1_Promag50":





People for Process Automation

- Mandatory Inputs
 - The parameter "modulePollingAddress" corresponds to the module polling address. In this example, the parameter is set to 0.
 - The parameter "moduleIP" corresponds to the IP address of the HART Module on which is connected the device. In this example, the IP address of the AHI0812 HART module is <u>10.126.105.55</u>.
 - The parameter "devicePollingAddress" corresponds to the device polling address. In this example, the parameter is set to 0.
 - The parameter "deviceChannel" corresponds to the HART module's channel on which is connected the device.
 - The parameter "startRead_Ch1" corresponds to the function block start bit.
- Outputs
 - The parameter "valueTOT1" corresponds to the received and decoded totalizer1 value in this example.
 - The parameter "errorEIP" is set to TRUE as soon as an Ethernet IP error is detected.
 - \circ The other parameters display status of the EIP and HART communication.

5.4.2 Function block "readTotalizer1_Promag50" Configuration

• Create following Boolean variable "startReset_Ch1":

ariables	DDT Types	Functi	on Blocks	DFB T	ypes
Filter	T 🐝	Nar	ne 🖃 🔭		
Name		•	Туре	•	Value
e	enable_CMD		BOOL		1
💛 V	alueTOT1		REAL		1
💛 s	tartRead_Ch1	8	BOOL		
🔶 s	tartReset_Ch1	0	BOOL		

• Assign all required variables to the function block "readTotalizer1_Promag50":

Reset Promag5	0 totalizer 1 value				ж Т
- to	25	. (t)		23	12
1 0				· 2	<i>.</i>
20	res	etTotalizer1_Promag50	0_0		CTU_1
192	anable OND	resetTotalizer1	Promag50	1420	CTU 3
45 		EN modulo Dolling Addrono	ENO		<u>cu</u> 0
55 	10 126 105 55	modulePoilingAddress	resetDone		
41 12 12 12 15 15 15 15 15 15	10.120.100.00	mouler	errorEID		
	0	devicePollingAddress	status EIP		
	1—	deviceChannel	StatusEn		
18	2.		moduleStatusByte1	<u>10</u>	12
	2		moduleStatusByte2	9_ 0	15
13	18				2
20	102		deviceStatusByte1	10 - 1 0	12
10 	8		deviceStatusByte2		
aaar ka	startReset_Ch1—	startCommand	startCommand	<u>–</u> la 1 2 2 1	n 101 a É a c n 101 a
38		the second se	and the second s	U ()(2)	



People for Process Automation

- Mandatory Inputs
 - The parameter "modulePollingAddress" corresponds to the module polling address. In this example, the parameter is set to 0.
 - The parameter "moduleIP" corresponds to the IP address of the HART Module on which is connected the device. In this example, the IP address of the AHI0812 HART module is <u>10.126.105.55</u>.
 - The parameter "devicePollingAddress" corresponds to the device polling address. In this example, the parameter is set to 0.
 - The parameter "deviceChannel" corresponds to the HART module's channel on which is connected the device.
 - The parameter "startReset_Ch1" corresponds to the function block start bit.
- Outputs
 - The parameter "resetDone" corresponds to the output status bit and is connected to a counter. If the reset is successful, the counter parameter "CV" is incremented. The preset value "PV" has been initialized to "10000" in this example. As a consequence, if the current counter value "CV" reaches 10000, the output "Q" is set to TRUE.
 - The parameter "errorEIP" is set to TRUE as soon as an Ethernet IP error is detected. The other parameters display status of the EIP and HART communication.





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5.5 Online Monitoring

- Before using the function blocks with the Promag50, make sure that its deviceDTM is disconnected as wells as the HART module comDTM of the corresponding card on which the Promag50 is connected.
- The startCommand bit "startRead_Ch1" is set to "TRUE". The totalizer output value is successfully read:

Read Promag50 t	otalizer 1 value			2 14
	re	adTotalizer1_Promag50	0	
	enable CMD	readTotaizer1	Promag50 FNO	
	0	modulePollingAddress	value Tota izer1	<mark>94550.5</mark>
	10.120.100.00		errorEIP	
	0— 1—	devicePollingAddress deviceChannel	STATUSEIP	 U
			moduleStatusByte1 moduleStatusByte2	— <mark>0</mark> —80 · · ·
	÷		deviceStatusByte1	0
24 	*		deviceStatusByte2	— <mark>0</mark>
	startRead_Ch1-	startCommand	startCommand	

• The startCommand bit "startReset_Ch1" is set to "TRUE". The totalizer output value is successfully set to zero. When finished, the counter parameter "CV" is incremented and the startCommand bit "startReset Ch1" is automatically set to "FALSE":

Reset Promag50 totalize	r1 value			
	······································			
•	•			• 4.
	resetTotalizer 1 Promac50	0		CTU 1
		2		3
	nable CMD—EN	_Promagou		CIU
	0-modulePollingAddress	resetDone		
10.4	126.105.55' moduleIP			· · · — R — · ·
12		errorEIP		10000 PV CV 1
	0-devicePollingAddress	statusEIP	— <mark>0</mark>	
	1-deviceChannel	2000		<i>1</i> 2
	•	moduleStatusByte1	— <mark>0</mark>	<i>K</i>
	*	moduleStatusByte2	<mark>—80</mark>	10 A
	*			*:
1		deviceStatusByte1	— <mark>0</mark>	5.
		deviceStatusByte2	— <mark>64</mark>	
tert	Dopot Ch1 startCommand	atartCommond.		en A de la la la seconda de la de
cart	startCommand	stancommanu		





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6 Routed Tool Integration

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

6.1 Schneider Electric "EtherNet/IP Comm Adapter" DTM Configuration

• Start the application FieldCare:



• Create a new project:

Create Project	Connection Wizard	MultiDrop	Point-to-Point	SOFTING
PCP Interface	ISS Interface	IPC Interface	CDI FXA291	CDI USB
FOUNDATION				
National Inst.				
eates an empty p	project			

Right-click on the Network Tag "Host PC" and select the menu "<u>A</u>dd Device":
 Network Tag
 Connection Channel
 ↓ △ Device typ... Physical Device





• Select the DTM "EtherNet/IP Comm Adapter" and click on the button "OK":

> Device	Version	Class	Manufacturer	Protocol
EtherNet/IP Comm Adapter	V1.5.1 (2016-01-25)	dtmSpecific	Schneider Electric	EtherNetIP

• The DTM "EtherNet/IP Comm Adapter" is implemented in the Network view:

Network Tag	Connection	Channel	1 4	Device type (DTM)	Physical Device
EtherNet/IP Comm Adapter			-	EtherNet/IP Comm Ada	apter

• Double-click on the DTM "EtherNet/IP Comm Adapter". This opens the offline Configuration window. Verify the Host Address IP address:



• Select the tab "Scan":







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- Select the "Scan Mode" option "Range" and indicate the IP addresses of the HART cards and click on the button "Apply". In this example, there are 3 cards:
 - $\circ \quad 1^{st} \, card:$ AHI0812 with IP address 10.126.105.55
 - \circ 2nd card: AHI0812 with IP address 10.126.105.56
 - \circ 3rd card: AHO0412 with IP address 10.126.105.57

EtherNet/IP Comm Adapter (Configuration) 🗙	x
EtherNet/IP Comm Adapter V1.5.1 Communication DTM	Schneider Electric
Configuration Runtime AddressTable Scan	
Single • Range • Broadcast Start address : 10 . 126 . 105 . 55 End address : 10 . 126 . 105 . 57	
ОК	Cancel Apply Help

• Configured IP addresses for the "Scan Mode" and click on the button "OK" to close the window:

EtherNet/IP Comm Adapter (Cont	figuration) 🗙		x
EtherNet/IP (Communication	Comm Adapter V1.5.1 on DTM		Schneider GElectric
Configuration Runtime Address	Table Scan		
Scan Mode			
C Single (Range Start address : End address :	C Broadcast 10 126 105 55 10 126 105 57		
		OK Cancel	Apply Help



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• In the network view, select the DTM "EtherNet/IP Comm Adapter" and select the shortcut button "Create Network":

😳 i 🎽 👄 🗔 i 🏘 i 👫 i 🖄	K + K	: 🕹 🗞		🐐 - i 🛼 5., 5.,
<u>File Edit V</u> iew <u>D</u> evice Operatic	on DTM <u>C</u> ata	log <u>⊺</u> ool:	Create network	
Vetwards Taxa	Connection	Channel	LA Hevice type (1)1M)	Physical Device

Schneider Electric HART cards have been found and inserted in the project. However, no Endress+Hauser devices have been scanned. This must be done manually:
 FieldCare SFE500 - Plant Asset Management (PAM) - DB

🕼 🚵 😂 🖬 斗 📑 🖄 🐔	- 🏦 😘 🗞 👘 🕼 🕼	1 8 8 8 1	····	: Bx			
File Edit View Device Operation D	TM Catalog Tools Window	Extras Help					
I		1					
Network Tag	Connection Channel	Address 🛆	Device type (DTM)	Physical Device			
La Host PC							
🔄 🌙 📖 🔄 EtherNet/IP Comm Adapter	4▶		EtherNet/IP Comm A	dapter			
BMEAHI0812	EtherNetIPComm	Channel 10.126.105.5	5 BME AHI 0812				
BMEAHI0812	EtherNetIPComm	Channel 10,126,105,5	6 BME AHI 0812				
BMEAH00412	EtherNetIPComm	Channel 10 126 105 5	7 BME AHO 0412				
DTM messages	Fron/Liser message						
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HABT_Channel4)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel5)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART Channel6)					
BMEAHI0812	Cannot scan the char	nel (HART_Channel7)					
BMEAHI0812							
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel0)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel1)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel2)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel3)					
BMEAHI0812	Cannot scan the char	nel (HART_Channel4)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel5)					
BMEAHI0812	Cannot scan the char	Cannot scan the channel (HART_Channel6)					
	Lannot scan the char	nei (HART_Channel/)					
BMEAH0012	Cannot scan the char	nel (HABT, ChannelO)					
BMEAHO0412	Cannot scan the char	nel (HART_Channel1)					
BMEAH00412	Cannot scan the char	nel (HABT_Channel2)					
BMEAH00412	Cannot scan the char	nel (HART_Channel3)					
BMEAH00412							
EtherNet/IP Comm Adapter	Finished scanning.						



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6.2 Endress+Hauser deviceDTM Configuration

• Right-click on the DTM "BMEAHI0812" and select the menu "<u>A</u>dd Device...":

Eile	🚵 📂 🗔		• 👔 ! 🖏	🗽 i 🔥 ሌ 🎼 i 🐐	tions	• ho So Se h	k Br	
File		Device Operation D1						n
Network	ĸ			· · · · · · · · · · · · · · · · · · ·				Ψ
Network	k Tag		Connection	Channel	Address 🗠	Device type (DTM)	PI	hysical Device
31	Host PC			· · · · · · · · · · · · · · · · · · ·				
	Ether	let/IP Comm Adapter			8	EtherNet/IP Comm	Adapter	
		JIME AHUUR 2		EtherNetIPCommChannel	10.126.105.55	BME AHI 0812		
		BMEAHI0812		EtherNetIPCommChannel	10.126.105.56	BME AHI 0812	14 A	dd Device
		BMEAHO0412	${\rm I}{\rm I}$	EtherNetIPCommChannel	10.126.105.57	BME AHO 0412		elete Device aunch Wizard

• Select the DTM "Promag/10/V1.03.00" for this example:

△ Device	Version	Class	Manufacturer	Protocol
Placeholder FieldDevice	V2.01.00 (2003-12-09)	Ψ.	Endress+Hause	HART, Profibus DP/V0, Profibus DP/V1, FF H1, FF
Promag / 10 / V1.00.00 V1.00.02	V 1.4.186.501 (2016-05-11)	鹶 flow	Endress+Hauser	HART
Promag / 10 / V1.01.00	V 1.4.186.501 (2016-05-11)	how f	Endress+Hauser	HART
Promag / 10 / V1.02.00	V 1.4.186.501 (2016-05-11)	🕪 flow	Endress+Hauser	HART
Promag / 10 / V1.03.00	V 1.4.186.501 (2016-05-11)	flow	Endress+Hauser	HART

• Select the channel number on which the device is wired; channel 0 in this example and click on the button "OK":

🖾 Assign Device to Channel		
Channels:		
△ Channel Name	Count/ Assigned Device(s)	
HABT_Channel0 HART_Channel1 HART_Channel2 HART_Channel3 HART_Channel4 HART_Channel5 HART_Channel5 HART_Channel6 HART_Channel7 InputDataRealsizeinByte InputDataRealsizeinByteRo OutputDataRealsizeinByte		
	ОК	Cancel

• Device DTM is implemented in the Network view:

Network Tag	Connection Cha		on Channel Address 🗠		Physical Device	
Host PC						
EtherNet/IP Comm Adapter	1			EtherNet/IP Comm Adapter		
A BMEAHI0812	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.55	BME AHI 0812		
O PROMAG10	$\triangleleft \triangleright$	HART_Channel0	0	ET Promag / 10 / V1.03.00		
BMEAHI0812	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.56	T BME AHI 0812		
BMEAHO0412	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.57	T BME AHO 0412		



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6.3 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 "BMEAHO0412" and select the menu "Add Device...":

Network Tag	Connection	Channel	Address 🗠	Device type (DTM)	Physical Device
U Host PC					a inter
EtherNet/IP Comm Adapter				EtherNet/IP Comm Ada	pter
Amm BMEAHI0812	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.55	BME AHI 0812	
O PROMAG10	$\triangleleft \triangleright$	HART_Channel0	0	ET Promag / 10 / V1.03.00)
BMEAHI0812		EtherNetIPCommChannel	10.126.105.56	BME AHI 0812	
BMEAHO0412		EtherNetIPCommChannel	10.126.105.57	BME AHO 0412	Add Device
				T ₄	Delete Device
				~	Launch Wizard

• Select the iDTM "AUMATIC AC01.2/ACEx01.2 Rev1" for this example:

△ Device	Version	Class	Manufacturer	Protocol
AUMATIC AC 01.2/ACEx 01.2 Rev 1	VDD Rev 0x1 (2017-01-16)	🌉 valve	AUMA (iDTM)	HART
Cerabar M / PMx 4x / V1.0 1.2	V 1.4.186.501 (2016-05-11)	pressure	Endress+Hauser	HART

• Select the channel number on which the device is wired; channel 0 in this example and click on the button "OK":

🖾 Assign Device to Channel		
Channels:		
🛆 Channel Name	Count/Assigned Device(s)	
HART_Channel0 HART_Channel1 HART_Channel2 HART_Channel3 InputDataRealsizeinByte InputDataRealsizeinByteRo OutputDataRealsizeinByte		
	ОК	Cancel

• Device DTM "AUMATIC AC01.2/ACEx01.2 Rev1" is implemented in the Network view:

Network Tag	Connection Channel		Address 🗠	Device type (DTM)
Host PC	ANGLES .			
EtherNet/IP Comm Adapter			·	EtherNet/IP Comm Adapter
Amm BMEAHI0812	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.55	T BME AHI 0812
PROMAG10	$\triangleleft \triangleright$	HART_Channel0	0	ETPromag / 10 / V1.03.00
BMEAHI0812	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.56	T BME AHI 0812
A BMEAHO0412	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.57	T BME AHO 0412
AUMATIC AC 01.2/ACEx 01.2 Rev 1	$\triangleleft \triangleright$	HART_Channel0	0	AUMATIC AC 01.2/ACEx 01.2 Rev 1

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6.4 DeviceDTM Online Connection

• Before connecting the HART module comDTM and deviceDTMs, make sure that all HART function blocks are deactivated in the program. Please refer to chapter 3.2.5.1.

*	Com_0_module_CerabarM	
enable CM	EN Com_0_module_device	20 20
* *	Module_polling_add Module_ID_1 —2726760972 2 Device_channel Module_ID_2 —37	
	Device_polling_add Device_ID_1	
'0.0.3{10.126.105.55}UNC.CII startCMD0_Cerabar		ID0_CerabarM

6.4.1 Endress+Hauser PROMAG 10 Online Connection

Right-click on the deviceDTM "Promag/10/V1.03.00" and select the menu "<u>Connect</u>":
 FieldCare SFE500 - Plant Asset Management (PAM) - DB

File	Edit View	Device Operation	DTM <u>C</u> atalo	g <u>T</u> ools <u>W</u> indow E <u>s</u>	tras <u>H</u> elp			
Networl	¢							
Network	k Tag		Connection	Channel	Address 🗠	Device t	ype (DTM)	Physical Device
31	Host PC							
<u>d</u>	Ether	Net/IP Comm Adapter				Ether	Net/IP Comm Adap	ter
	·	BMEAHI0812		EtherNetIPCommChannel	10.126.105.55	BME	AHI 0812	
			$\langle \! \rangle$	HART_Channel0		EH Car	140 114 00 00	
		BMEAHI0812		EtherNetIPCommChannel	10.126.105.56	1 12	Add Device	
	🔲	BMEAHO0412	\ll	EtherNetIPCommChannel	10.126.105.57	1 🗽	Delete Device	
						X	Launch Wizard	
						0	Device type (D	TM) info
							Connect	

• Connected device:

FieldCare SFE500 - Plant Asset Manage	ement (PAM)	- DB			
💽 🔯 🐸 🖬 斗 🔃 🖼 🐧	6 • 👔 i	14 1k 15 16 m	1 1 1 1	7 - 1 km 30 34 km 34	
<u>File Edit View Device Operation</u>	DTM <u>C</u> atalo	g <u>T</u> ools <u>W</u> indow E <u>x</u>	tras <u>H</u> elp		
Network					
Network Tag	Connection	Channel	Address 🛆	Device type (DTM)	Physical Device
Host PC					
EtherNet/IP Comm Adapter	4⊳		-	EtherNet/IP Comm Adapter	
BMEAHI0812	1>	EtherNetIPCommChannel	10.126.105.55	T BME AHI 0812	
PROMAG10	4>	HART_Channel0	0	EII Promag / 10 / V1.03.00	
BMEAHI0812	$\triangleleft \triangleright$	EtherNetIPCommChannel	10.126.105.56	BME AHI 0812	
BMEAH00412	$\langle \rangle$	EtherNetIPCommChannel	10.126.105.57	T BME AHO 0412	





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• Double-click on the device DTM "Promag/10/V1.03.00". This opens the device DTM window:

PROMAG10 (Onlin	e Parameterize) 🗙						×
Language							
	k						
DeviceTune	Bromag (10 / \/1 02 (0 Software rea	1	VOLUME ELOWA	0.000	1/m	
Model	PROMAGIO	TAC NAME	I DROMAGIO	ACTUAL CURRENT.	4.00	with the second	1
Device status	Sustem OK	TAO NAME:	PROMAGIU	ACTOAL CORRENT:	4.00	mA	Endross + Hauson
Device status:	- System OK						LIIUIESSTIIduSei
 ● 優 GROUP S ● 優 Device Da 	ta						
. <u> </u>	Þ		00010	51 F.CT			
Conline			GROUP	SELECT			
	onnected						? 😓 😔

6.4.2 AUMA Actuator Online Connection

• Right-click on the deviceDTM "AUMATIC AC01.2/ACEx 01.2 Rev1" and select the menu "Connect":

Network Tag	Connection	Channel	Address 🗠	Device type (DTM)	Physica.
Host PC		14 19 19 19 19 19 19 19 19 19 19 19 19 19		- Statistics	
EtherNet/IP Comm Adapter BMEAHI0812 PROMAG10 MEAHI0812		EtherNet/PCommChannel HART_Channel0	10.126.105.55 0	HerNet/IP Comm Adapter HBME AHI 0812 HPromag / 10 / V1.03.00 Rev Aut 0912	
BMEAHO0412		EtherNetIPCommChannel	10.126.105.56 10.126.105.57 0	BIME AHO 0412 BME AHO 0412	1
T**	<u>A</u> dd Device <u>D</u> elete Device <u>L</u> aunch Wiza	rd			
6	Device <u>t</u> ype (<u>C</u> onnect	DTM) info			





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• Connected device:

Network Tag		Channel	Address 🛆	Device type (DTM)	
Host PC		20.			
BtherNet/IP Comm Adapter			8	EtherNet/IP Comm Adapter	
BMEAHI0812		EtherNetIPCommChannel	10.126.105.55	T BME AHI 0812	
PROMAG10		HART_Channel0	0	CIII Promag / 10 / V1.03.00	
BMEAHI0812		EtherNetIPCommChannel	10.126.105.56	T BME AHI 0812	
BMEAH00412		EtherNetIPCommChannel	10.126.105.57	BME AHO 0412	
AUMATIC AC 01.2/ACEx 01.2 Rev 1		HART Channel0	0	AUMATIC AC 01.2/ACEx 01.2 Rev	

• Double-click on the device DTM "Promag/10/V1.03.00". This opens the device DTM window:

Network					÷ ×	AUMATIC (Online Pa	arameterize) 🗙		
Network	Tag 🗠		Connection	Channel	Address		1	Device Name: AUM	14TIC AC 01.2/ACEx 01.2 Rev 1
3	Host PC						ТАЛ	Device Vendor: AUN	
<u>⊿</u>	Ether!	Vet/IP Comm Adap			-		by CadeWrights		
		BMEAHI0812		EtherNetIPCommChannel EtherNetIPCommChannel	10.126.105.55		10000000	Tag:	
		BMEAH00412		EtherNetIPCommChannel	10.126.105.57				
		AUMATIC	()	HART_Channel0	0				
						Dnline 🗁		Device setup Customer	settings Device configuration
								Display	
								Language:	Deutsch 🖌
								Date format:	DD.MM.YYYY
								Time format:	24h
								Number format:	xx,x 🗸
								Torque unit:	Nm
								Temperature unit:	°C 🔽
							:	Diagnostic classification:	AUMA
								Device ID	
								Identification	
								Device designation:	AC 01.2-SIL
								Device tag:	2216MA95020
								Project name :	_PROJEKT_
								Controls	
								Actuator	
								Action	
								Version	
•	III				Þ	Connected	<u>(5)</u>	😫 🗖 ∪	ser Role: PlanningEngineer





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



• Value of the configured set point done in chapter 3.4.2.2:

AUMATIC (Online Parameterize)	X AUMATIC (Observe) Device Name: Device Vendor: Tag:	X AUMATIC AC 01.2/ACEx 01.2 Rev 1 AUMA (iDTM)		
Process variables Process variables	Variable 0, AI loop Variable 2, value:	o current Variable 1, AO loop current	Variable 2, setpoint position	Variable 3, actual position
	DV2: Classification: DV2: PDQ: DV2: LS: DV2: Family Status	I: Device variable not classified Image: Good Good Image: Image: Good Not limited Image: Imag	✓ ✓ ✓	





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• Value of the configured feedback. This is the same value as in chapter 3.4.2.2:

AUMATIC (Online Parameterize)	× AUMATIC (Observe) ×			
	Device Name: AUMA	ATIC AC 01.2/ACEx 01.2 Rev 1		
idtm	Device Vendor: AUMA	A (iDTM)		
presented by CashWreghts.	Tag:			
	NHL .			
🖃 🦢 Process variables	Variable 0, AI loop curre	nt Variable 1, AO loop current	Variable 2, setpoint position	Variable 3, actual position
Process variables	Variable 3, value: 🕰	10.7 %		
	DV3: Units:	%		
	Sensor information			
	DV3: Classification:	Device variable not classified	\sim	
	DV3: PDQ:	Good	\checkmark	
	DV3: LS:	Not limited	\checkmark	
	DV3: Family Status: 💋	More device family status av	vailable	





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