

TECH NOTE – EtherNet/IP with SoMachine

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Brief description

This document is meant to be a guideline to demonstrate the use of a ClipX measurement amplifier within a Ethernet/IP network. For this example a Schneider SoMachine Station is used as PLC. There is also an explanation of how ClipX measurement values can be monitored in the SoMachine software. Basic knowledge of Ethernet/IP network and HBM amplifiers are recommended. The basic setup is shown in the figure below.



EtherNET/IP commissioning

Make sure, the right Fieldbus is selected. ClipX BM40IE is able to handle EtherCAT, Ethernet/IP and Profinet. Assign a static IP address, Netmask for example 192.168.2.5 - 255.255.255.0.

Type in, the ClipX IP address into the web browser or double click on ClipX in Network. The present ClipX has the fix IP address 192.168.1.25.



НВМ		ClipX > Fieldbus	
ħ	Home	ClipX 🛛 📴 Default name of parameter set (01)	
<···>	Network		
\$	Device	Settings	
	Amplifier	Protocol type	
Σ	Calculated Channels	EtherNet/IP -	
$\overline{\uparrow}$	Peak Values	Firmware state	Firmware version
0	Captured Values	running	3.4.0.0
	Limit Switches		
٢	Digital I/O		
Û	Analog Output	EtherNet/IP [®]	
Ō	Fieldbus	Config Control	
< >	Ethernet API	STATIC -	
	ClipX Bus	IP Address	Netmask
٦	Parameter Sets	192.168.2.5	255.255.255.0
		MAC Address 00-09-e5-00-9a-49	Domain Name

Now we beginning with the ClipX integration. Start SoMachine4.3 from the Desktop.Connect Controller-> select.

Get started									
Start > Connect Controller >	Select Cont	roller >			Remaining ti	me until tri	al period expir	res :17day(s)	Registratio
Recent Projects	Controller	Project Name	Address	Cartridge	Time since boot	Author	Firmware	Node name	
Connect Controller >	Ethernet		400 460 4 0	0 ====	04-1 04- 04- 07	o odacio	1400000	TMOEANE	
New Project	TM25TME5		192.108.1.3	9 none	010 010 34m 27	s admin	V4.U.0.20	TM25TME	SE @UU8L
Open Project									
	٩[•
	Filter:		Add connect	ion			Ref	fresh	Select



In this example the PLC has already the IP address 192.168.1.39. If you work the first time with the PLC you can address the PLC via USB cable for example. Create new project.

0	Open project file Project file automatically detected	
`▲_	Create new project Test	
0	Create project with template Project name : Selected template : Test	
0	Upload project from controller	
0	Download project to controller	
0	Use maintenance tools Controller Assistant	

Switch to Logic Builder. If you have already PMX Codesys experiences, you will see a familiar programming environment.

Test.project □ <	Logic Builder	-Designer SoMachine Ba	sic Maintenand	ce 💌 Tools 💌		
Workflow	Versions	Properties				
Workflow	1		Applica	tion Design		
		Configuration	Controller Program one or multiple controllers Motion	HMI Program and design year HMI moves i Functional Safety Program Encodemia	Multiple Download	Maintenance Set of tools helping to maintain your machine.
Configuration	on to add and remove devices to/from	the currently opened project	t Launching the L	ogicBuilder in the config	uration mode is also an opt	ion
The configuration step offers the opti-		and our charg opened projec	a countering the co	spice and crimine coming	and on mode is also an opt	



IP address configuration Ethernet1: (Ethernet communication between Laptop, SoMachine, ClipX web server and PLC)

Ele Edit View Project Build Online Debug Tools Window Help	▶ ■ Ç≣ €⊒ 4⊒ +≣ Ş	🗢 📑 🖓 Select All
Devices 🗸 🕂 🗙	Ethernet_1 X	
Test	Configuration	
Grand MyController (TM251MESE)	Configured Parameters	
E Diction	Interface Name usb0	
GVL	Network Name my D	evice
Library Manager		
E Isk Configuration	IP Address by DHCP	
MAST	IP Address by BOOTP	
IO_Bus (IO bus - TM3)	Interpretation in the second secon	
COM_Bus (COM bus)	IP Address	192 . 168 . 1 . 39
Ethernet_1 (Ethernet Network)	Subnet Mask	255 . 255 . 255 . 🤰
Ethernet_2 (Device Network) Industrial_Ethernet_Manager (Industrial Ethernet Manager)	Gateway Address	0.0.0.0
😑 🛷 Serial_Line_1 (Serial line)	Ethernet Protocol	Ethernet 2
SoMachine_Network_Manager (SoMachine-Network Manager)	Transfer Rate	Auto

IP address configuration Ethernet2: (EtherNET/IP communication between PLC and ClipX)

Devices	🗕 🕂 🗡	Ethernet_1	🛉 Ethe	rnet_2 🗙
Test		Configuration	_	
🖻 - 📳 MyController (TM251MESE)		- Configured Parameters	-	
PLC Logic		Interface Name	Ethernet	tPort0
= Q Application				
GVL		Network Name	my_Devi	ice
Library Manager		IP Address by D	HCP	
ask Configuration		IP Address by B	OOTP	
		fixed IP Address		
COM Bus (COM bus)		ID Address	-	192 . 168 . 2 . 45
Ethernet 1 (Ethernet Network)		IF Address		
Ethernet 2 (Device Network)		Subnet Mask		255 . 255 . 255 . 0
Industrial Ethernet Manager (Industrial Ether	ernet Manager)	Gateway Addre	SS	0.0.0.0
Serial Line_1 (Serial line)		Ethernet Protocol		Ethernet 2
SoMachine_Network_Manager (SoMachine-N	etwork Manager)			
		Transfer Rate		Auto
		Security Parameters		
		SoMachine protocol	active	
		Modbus Server acti	ve	
		Web Server active		
		FTP Server active		
		Discovery protocol	active	
		SNMP protocol activ	/e	
		WebVisualisation pr	re notocol acti	ive
		w webvisualisation pr	otocor acti	ive .
		-Slave device identificat	tion	
		DHCP Server activ	<u>/e</u>	
		When active, each dev	vice that w	ill be added to the fieldbus,
		MAC Address, instead	of its IP A	ddress.



ClipX EtherNET/IP .eds file intigration. In general we need to integrate the ClipX .eds file first. It is already done, just keep in mind, if you work the next time with SoMachine.



Add ClipX device. Right mouse click on Industrial_Ethernet_Manager. Add device.



🖹 📲 MyController (TM251MESE)



Make sure identical EtherNET/IP addresses from ClipX SoMachine Project and ClipX address assigned in Web browser.





Add Connection.

Devices 👻 🕂 🗙	🕤 ClipX 🗙						
Test	Target settings Connections	User Parameters EthernetIP	I/O Mapping Status	Information			
MyController (IM251MESE)	Connection N [®] Connecti	on Name RDI O>T (mr)	RPIT>0 (ms)	O>T size (but	e) T>O size (but	(a)	
	Connection in Connecti	contraine Rei C> I (IIIs)	(IIII)	0> 1 Size (byt	e) 1>0 size (by		
- GVL		New connection					
Library Manager		apperic connection (fre	e configurable)				
🖃 💹 Task Configuration		predefined connection	(FDS-File)				
MAST		Choose a connection	(2001112)				
- IO_Bus (IO bus - TM3)				DDIT (O())	0.7.0.1	T : 0 : 4 : 1	
COM_Bus (COM bus) Sthemast 1 (Sthemast Network)		Connection Name	RPI O> T (ms)	RPI I>O (ms)	O>I size (byte)	1>O size (byte)	_
Ethernet 2 (Device Network)		Exclusive Owner	10	10 3	80	200	
Industrial Ethernet Manager (Industrial Ethernet Manager)		Input Only	10	10		200	
ClipX (ClipX)							
🗷 💞 Serial_Line_1 (Serial line)							
		Generic Parameters					
		Connection Name	Exclusive Owne	er			•
	Add Connection	Timeout Multiplier	4	•			
	Configuration Data						
	Symbolic values	Scanner to Target (Outp	ut)		Target to Scanner (Ir	nput)	
	Parameters Value	O>T Size (Bytes)	80		T>O Size (Bytes)	200	
		RPI (ms)	10		RPI (ms)	10	
					Triana Tran	Curta	
		Trigger Type	Cyclic		ingger i ype	Cyclic	
		Inhibit Time (ms)	0		Inhibit Time (ms)	0	
					Fallback Mode	Go to zero <default></default>	-
		Show all parameters >	>>		4	OK Cancel	

With ClipX it will be not necessary to handle the Assembly Instance Object 199. This Object defines the number of transferred channels. At the moment ClipX work with the max. possible number of channels.

Target(ClipX) -> Scanner(PLC) = 166 bytes (assembly 100).

Scanner(PLC) -> Target(ClipX) = 44 bytes (assembly 101).

In general it will be possible to decide from ClipX web server the number of transferred channels.

EthernetIP I/O Mapping. SoMachine mapped all inputs and outputs as Word (2 Bytes). ClipX format for measured values is Real(4 Byte). We need a small program for it.

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Elle Edit View Floject Build Online Debug Tools Window Help)			
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Devices 🗸 🗸 🗶	ClipX 🗙			
Test	Target settings Connections Use	r Parameters EthernetIP I/O Mapping	Status Informatio	n
🖹 🔮 MyController (TM251MESE)	Channels			
PLC Logic				-
Application	Variable	Mapping Channel	Address	Туре
GVI.	📃 📮 🍫	Input Exclusive Owner	%IW5	ARRAY [099] OF WORD
Library Manager	* \$	Input Exclusive Owner [0]	%IW5	WORD
	*	Input Exclusive Owner [1]	%IW6	WORD
MAST	¥ø	Input Exclusive Owner [2]	%IW7	WORD
TO Bus (TO bus - TM3)		Input Exclusive Owner [3]	%IW8	WORD
COM Bus (COM bus)	* >	Input Exclusive Owner [4]	%IW9	WORD
Ethernet 1 (Ethernet Network)	*	Input Exclusive Owner [5]	%IW10	WORD
Ethernet 2 (Device Network)	* ø	Input Exclusive Owner [6]	%IW11	WORD
Industrial Ethernet Manager (Industrial Ethernet Manager)	1	Input Exclusive Owner [7]	%IW12	WORD
	🍫	Input Exclusive Owner [8]	%IW13	WORD
	***	Input Exclusive Owner [9]	%IW14	WORD



Add POU(Programm Organization Unit) with right mouse click on Application.

E Test			l					Cili and the literation
MyController (TM251MESE)			1	Target settings	Conr	nections	User Parameters	EthernetIP .
				Channels				
				Variable	1		Mapping	Channel
GVL	*	Cut						Input Exclusi
Library Manager	P)	Сору						Input Exclusi
Task Configuration	e.	Paste						Input Exclusi
MAST	×	Delete						Input Exclusi
IO_Bus (IO bus - TM3)	· `							Input Exclusi
COM_Bus (COM bus)		Properties						Input Exclusi
Ethernet_1 (Ethernet Network)	۶	Add Function F	r	om Template				Input Exclusi
🗐 💻 Ethernet_2 (Device Network)	*::	Add Object		2 .	Ô	Applicati	ion	
🖃 👔 Industrial_Ethernet_Manager (Industrial		Add Device				DataLog	Manager	
ClipX (ClipX)		Insert Device			A	DUT		
Serial_Line_1 (Serial line)		Scan For Devic	e	s		Global V	ariable List	
	3	IO Summary				Image P	ool	
		Power consumption			⊶0	Interfac		
	Add Folder			<i>6</i>	Network	eiver)		
	ĥ	Edit Object			3	Network	: Variable List (Sen	der)
	Edit Object With		l		OPC UA Symbol Configuration Persistent Variables			
	OS	Login						T
	7	- Advanced Con	fi	guration	≞	POU	3	
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				¥ø	12	Relocati	on Table	
				1 ×	•••	Symbol of	configuration	
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				¥ø	•	Visualiza	tion	
				│ ···· *>		Visualiza	tion Manager	
					@	Web Da	ta Configuration	

Open the field for variable declaration.





The assignment from %IW5...%IWxx to ClipX data you can find in ClipX Fieldbus I/O Image. See therefore the screenshot below.

<u>File Edit View Projec</u>	t <u>B</u> uild <u>O</u> nline <u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp							
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Devices	▼ ₽ X	/ 🖬	ClipX ¥					
= 👌 Test		Targe	t settings Connections	Liser Parameters	EthernetIP I/O Mapping	Status	Information	1
🖮 📳 MyController (TM	1251MESE)	Chan	nels	ober i di diffetero		otatao	2111011110100	
🖃 🗐 🛛 PLC Logic		Vari		Manaina	Channel	0.44		
🖹 🔘 Applica	ition	Van	able	iviapping	Channel	Add	iress	iype
- 🧖 GVL			Ма		Input Exclusive Owner		%1W5 A	RRAY [099] OF WORD
🎁 Libra	ary Manager				Input Exclusive Owner [0]		%1W5 V	VORD
🗏 🔛 Tas	< Configuration				Input Exclusive Owner [1]	_	%1VV0 V	VORD
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IO_Bus (IO b	bus - TM3)				Input Exclusive Owner [3]		761VV0 V	VORD
COM_Bus (C	OM bus)				Input Exclusive Owner [4]		701VV9 V	VORD
Ethernet_1 ((Ethernet Network)				Input Exclusive Owner [5]		761VV10 V	VORD
🗏 💻 Ethernet_2 ((Device Network)		× ×		Input Exclusive Owner [0]		P6TW12 V	VORD
Industria	al_Ethernet_Manager (Industrial Ethernet Manager)		¥.		Input Exclusive Owner [8]		%TW13 V	VORD
Clip)	X (ClipX)				Input Exclusive Owner [9]		%TW14 V	VORD
	ClipX ISP Default name of parameter set (01)		•				O 41 %	Status: EtherNet/IP CONNECTE
f Home								
↔ Network	Cattions							
Device	Settings							
Amplifier	Protocol type				Bus state			
E. Ordented Observate	EtherNet/IP -				CONNECTE	D		
Calculated Channels								
↑ Peak Values	Firmware state		Firmware version		NetX load			
Captured Values	running		3.4.0.0		10 %			
A Limit Switches								DOWNLOAD IO-IMAGE
Digital I/O								
ඩ් Analog Output	EtherNet/IP							
Ö Fieldbus								
Ethernet API	Config Control STATIC -							
III Cliev Due								
III Clipx Bus	IP Address 192 168 2 5		Netmask 255 255 255 0		Gateway			
Parameter Sets					0.0.0.0			
	MAC Address							

ClipX I/O Image:

Input (ClipX to scanner)		
start address	end address	item
0	3	ADC value
4	7	Field value
8	11	Gross value
12	15	Net value
16	19	Min value
20	23	Max value
24	27	Peak-to-peak value
28	31	Captured value 1



Write the following little program.

Clip	DI POU X
1	PROGRAM POU
2	VAR
3	
4	GrossValue at %md2 :real;
5	
6	END_VAR
<	
	%iw11 MOVE 1 %iw11 %mw4 3
	%iw12 %mw5 2

Normally it would be %IW9 and %IW10 for Grossvalue. Schneider PLC adds 4Byte (run/idle header) offset (green marked).

ClipX 🗙 👔 POU												
Target settings	Connections	User Parameters	Ethernet	IP I/O Mapping	Status	Information						
Channels												
Variable	Mapping	Channel		Address	Туре	Curr						
i⊒ ¥≱		Input Exclusive Ov	wner	%IW5	ARRAY)						
🍫		Input Exclusive Ov	%IW5	WORD	1							
* >		Input Exclusive Ov	wner [1]	%IW6	WORD	0						
* ø		Input Exclusive Ov	wner [2]	%IW7	WORD		4878					
* >		Input Exclusive Ov	%IW8	WORD		18638						
* ø		Input Exclusive Ov	wner [4]	%IW9	WORD	57301						
* ø		Input Exclusive Ov	wner [5]	%IW10	WORD	15305						
* >		Input Exclusive Ov	wner <mark>[6]</mark>	<mark>%IW11</mark>	WORD	37344						
¥ø		Input Exclusive Ov	wner [7]	%IW12	WORD		49214					

Login into the PLC





Start the PLC

<u>F</u> ile	<u>E</u> dit	<u>V</u> iew	Project	<u>B</u> uild	<u>O</u> nline	<u>D</u> ebug	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp			
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			GVL							📕 🖽 🍟		In
			前 Librar	y Manage	er					🖻 - ^K ø		0

Now you should see a changing Gross Value. Compare it with the value in ClipX web browser.

<u>F</u> ile	<u>E</u> dit	<u>V</u> iew	Project	CFC	<u>B</u> uild	<u>O</u> nline	<u>D</u> ebug	<u>T</u> ools	<u>W</u> indow	<u>H</u> elp									
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Devices 👻 🕂 🗙											ClipX	20	POU X						
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			-																

Disclaimer

These examples are for illustrative purposes only. They cannot be used as the basis for any warranty or liability claims.