

### Establishing a Connection with the Fenac Ethernet IP Encoder Device

Power cable and data cable are correctly connected to the device. Details about the connection pinout structure are explained in the section "4.Connector & Pin Assignment". Power cable and data cable are indicated in the figure on the side. It is also specified to which input ports the power cable and data cable will be connected to the Fenac Ethernet IP encoder. The device can be supplied with DC voltage in the range of 10V to 30V. The other end of the data cable must be connected to an Ethernet IP master. Here we will talk about two methods. Defining a personal computer as an ethernet IP master device and connect the data cable to the ethernet port of a PC is an easy method, as no external hardware is required. You can do your various tests in this way. The other method is to use a PLC device with Ethernet IP Master as traditionally









### Method 1: PC as Ethernet IP Master

If you have a PC with an Ethernet Ip compatible ethernet card, you can quickly establish a connection with this method without any external hardware. This method may not work depending on the chipset of your computer's ethernet card. After supplying the Ethernet Ip encoder by a voltage in the range of 10-30V from the power supply, connect the data cable to the Ethernet port of your PC. After this process, the status LEDs on the ethernet port of your PC will light up, indicating that there is a successful connection.

TwinCAT version 3 must be installed in your PC. Open the TwinCAT 3 interface.

Click on File>New>Project to start a new project. Give the project to a name then click OK.

New Project						? ×
▶ Recent		Sort by: Default	• # E		Search (Ctrl+E)	ρ.
<ul> <li>Installed</li> </ul>		TwinCAT XAE Project (XML	format)	TwinCAT Projects	Type: TwinCAT Projects	
TwinCAT Measurer TwinCAT Projects TwinCAT PLC TcXaeShell Solution	nent m				TwinCAT XAE System Manager Configuration	
Not finding what yo Open Visual St	u are looking for? udio Installer					
Name:	TwinCAT Project23					
Location:	C:\Users\ \[	Documents\TcXaeShell		•	Browse	
Solution name:	TwinCAT Project23				<ul> <li>Create directory for solution</li> <li>Add to Source Control</li> </ul>	
					ОК	Cancel





From the left tab click on I/O>Devices right click and Add a new item to add EtherNET IP master device. To define your PC as EtherNET IP master device chose "EtherNET/IP Scanner" and select Target Type as "PC only". Then click ok.

Insert Device X
Type: <ul> <li>EtherCAT</li> <li>Ethernet</li> <li>Profibus DP</li> <li>Profibus DP</li></ul>

In our case, Ethernet(Realtek Gaming GbE Family Controller) supports ethernet IP communication so we chose it and click OK.

Device Found At	X
(none) Ethemet (Realtek Gaming GbE Family Controller) Wi-Fi (Intel(R) Wi-Fi 6 AX201 160MHz) Local Area Connection* 1 (Microsoft Wi-Fi Direct Virtual Adapter) Local Area Connection* 10 (Microsoft Wi-Fi Direct Virtual Adapter #2)	OK Cancel O Unused All





In the left side The Device 1(TC3 EIP Scanner) added. Right click on it to "Import EDS File". Related twinCAT directory on your PC should open up and you need to add "Fenac\_Ethernet\_IP\_Encoder\_AEIPM.EDS" file to this folder. After that click on Fenac\_Ethernet\_IP\_Encoder\_AEIPM.EDS to select it and click Open.

🥙 Open				×
← → × ↑ 📜 « Twin	CAT > 3.1 > Config > Io > EtherNetIP	ٽ ~		
Organize 🝷 New folder				
S This PC	Nar	Date modified	Туре	Size
3D Objects	Z ATM60A_Cnc.eds	10 Nis 2012 11:26	EDS File	87
E. Desktop	2_01.eds	28 Nis 2023 10:32	EDS File	116
Documents	$\Rightarrow$ BK90 $\rightarrow$ Move to EtherNetIP	3 Şub 2022 13:11	EDS File	18
Downloads	BK9105.eds	3 Şub 2022 13:11	EDS File	18
b Music	EL6652-0010.EDS	3 Şub 2022 13:11	EDS File	14
Pieture e	ILB905.eds	3 Şub 2022 13:11	EDS File	30
	<b>TF6280.eds</b>	3 Şub 2022 13:11	EDS File	14
Videos	TS6280.eds	3 Şub 2022 13:11	EDS File	14
🐛 Local Disk (C:)				
🥪 DATA (D:)				
Projects (P:)				
→ <b>→</b> → → → → → → → → → → → → → → → → →				>
File name	:	~	EthernetIP EDS File (*.ed	s) ~
			Open	Cancel



On the left side again right click on Device 1(TC3 EIP Scanner) and add new item to add encoder slave device from our eds file. Find FENAC\_AEIPM device from there and select it and click OK to add it. If you don't have the EDS file you can download it from <a href="http://www.fenac.com.tr">www.fenac.com.tr</a>.





Insert Box	
Type:	)) - Fenac Multiple:
Name: Box 2	

After this addition you should configure the Master's Ip address. Double Click to "Device 1(TC3 EIP Scanner) to open settings. In the "settings" tab you should set an IP address under the F800:0 object. Set the master IP address and Network mask. In our case we are using 192.168.2.123 as master. And set the Network Mask as 255.255.255.0.

ndex	Name	Flags	Value	Unit	
F800:0	Master Settings	MRO	>43 <		
F800:01	Number	MRO	0x0001 (1)		
F800:03	Product Name	MRW	Device 1 (TC3 EIP Scanner)		
F800:04	Device Type	MRO	0x000C (12)		
F800:05	Vendor ID	MRO	0x006C (108)		
F800:06	Product Code	MRO	0x1889 (6281)		
F800:07	Revision	MRO	3.1		
F800:08	Serial Number	MRO	0x0000000 (0)		
F800:20	MAC Address	MRO	6E 02 E0 5B F2 38		
F800:21	IP Address	MRW	192.168.2.123		
F800:22	Network Mask	MRW	255.255.255.0		
F800:23	Gateway Address	MRW	0.0.00		
F800:24	DHCP Max Retries	MRW	0		
F800:25	TCP/IP TTL	MRW	128		
F800:26	TCP/IP UDP Checksum	MRW	TRUE		
F800:27	TCP/IP TCP Timeout	MRW	30 Seconds		
F800:28	MultiCast TTL	MRW	1		
F800:29	MultiCast UDP Checksum	MRW	FALSE		
F800:2A	Forward Class3 to AmsPort	MRW	DISABLED		
F800:2B	Advanced Options	MRW	0x0000 (0)		
F900:0	Master Info	RO	>43 <		





Finally we can set our FENAC\_AEIPM encoders IP address to. To do that right click on Box1 (FENAC\_AEIPM) and set the IP address as 192.168.2.101 then click OK. After this step the question mark on our encoder will disappear.

<ul> <li>Inputs</li> <li>Outputs</li> <li>Box 1 (FENAC_AEIPM) - No IP Address</li> </ul>	Change IP-Address		×	
<ul> <li>Inputs</li> <li>Outputs</li> <li>Mappings</li> </ul>	IP-Address:	192 . 168 . 2 . 101	OK Cancel	

Right-click on Box 1(FENAC\_AEIPM) > Append I/O connection > Exclusive Owner to add connection to our project.

Open the Connection 1 and click on Inputs then press reload devices button. You sould see the Proccess Datas such as Position Alarm and Velocity. If you do not see the outputs, you should click on the 'Reload Devices' button above. (

Build 4024.32 (Loaded) 🝷 📰 🔤 🗾 🌫 💽	🐾 🔏 🛛 TwinCAT Project	23 • <local></local>	•	<b>-</b>	-
Solution Explorer 🔹 👎 🗙	TwinCAT Project23 🛥 🗙				
	Name [X	] Online 0x00000000	Type DWORD	Size >Addre 4.0 2.0	In/Out Linked to
Search Solution Explorer (Ctrl+s) Search Solution TwinCAT Project23' (1 project) Solution 'TwinCAT Project23' (1	Name (X Fault Header Position Value Alarm Flag Varnin Flag Velocity Value	Online 0x00000000 79810665 0x00 0x00 0	Type DWORD UDINT BYTE BYTE DINT	Size >Addre 4.0 2.0 4.0 6.0 1.0 10.0 1.0 11.0 4.0 12.0	In/Out Linked to Input Input Input Input
Outputs     Connection 1 (Input/Output)					
<ul> <li>Fault Header</li> <li>Position Value</li> <li>Alarm Flag</li> <li>Warnin Flag</li> <li>Velocity Value</li> <li>Outputs</li> <li>Mappings</li> </ul>					



#### **ETHERNET IP ENCODER OUTPUTS AND CONFIGURATION**

Solution Explorer	<b>•</b> ₽ ×	TwinCAT Project32	+ ×					
○ ○ 🏠 🛱 - │ ँ○ - 🗗 🖋 🗕		Name	[X]	Online	Туре	Size	>Addre	In/Out
Search Solution Explorer (Ctrl+ş)	- م	Pault Header		0x00040000	DWORD	4.0	2.0	Input
Solution 'TwinCAT Project32' (1 project)		Position Value		2553251	UDINT	4.0	6.0	Input
TwinCAT Project32		Alarm Flag		0x00	DVTE	1.0	11.0	Input
SYSTEM		Velocity Value		0,000	DINT	4.0	12.0	Input
MOTION		velocity value		0	DIN	4.0	12.0	mput
PLC PLC								
SAFETY								
<ul> <li>Device 1 (TC3 EIP Scanner)</li> </ul>								
1 Image								
Inputs								
Outputs								
Box 1 (EIS_V5_EXTENDED_CONFIG_DEMO)								
Inputs								
Outputs								
Connection 1 (Input/Output)								
P inputs								
Mappings								

Here you can see the position value and Velocity Value changing when you turn the encoder shaft. These are the Process Data and it updates cyclically.



### **CHANGING THE RESOLUTION**

Solution Explorer 👻 👎 🗙	Twin	CAT Project	32 -¤ ×				
○ ○ 🏠 🛱 -   "⊙ - @   🌶 🗕	Ge	eneral Setting	gs Config Instance Config Instance (hex)				
Search Solution Explorer (Ctrl+ş)		ParamID	Name	Value	Datatype	Offset	Size [Bytes(.Bit
Solution 'TwinCAT Project32' (1 project)		9	SingleTurn	262144	UDINT	0	4
TwinCAT Project32     Market System		10	Operating_Parameterr	0	UINT	4	2
MOTION		11	TotalRange	1073741824	UDINT	6	4
PLC PLC		12	Preset_Parameter	0	UDINT	10	4
SAFETY		13	preset_changed	0	UDINT	14	4
ANALYTICS ANALYTICS Devices Devices Image Inputs Outputs Outputs Inputs Inputs Outputs Inputs Inputs Inputs Outputs Inputs Outputs Outputs Outputs Outputs Outputs Inputs Imputs Inputs Inputs Inputs Inputs Imputs							

As shown in the above picture Config Instance has the SingleTurn Value to configure revolution per span. You can set it to a new value and enable scaling option to configure new resolution per span. TotalRange parameter is also same but it limits the highes countable point (overflow point). Both of this SingleTurn and TotalTurn value to work you should enable scaling by setting Operating\_Parameter's 2<sup>rd</sup> bit as 1. Operating\_Parameter also configures the CW and CCW increment options. By setting zeroth bit of the Operating\_Parameter you can configure the CW/CCW incrementations. 0 is CW and 1 is CCW so you should set it 1 for CCW.





#### CHANGING SINGLE-TOTAL TURN RESOLUTION EXAMPLE

In this example we set Scaling enable and CCW increment method by setting zeroth and second bits of Operating\_Parameter which means setting it as 5. We also configured SingleTurn as 10 count and TotalRange as 100. As shown in the below we should see 10 counts changing for every span int the Position Value parameter. And It will overflows and return back to 0 when Position Value reaches its high limit as TotalRange.

T۱	winCAT Project3	2 <del>1</del> ×				
I	General Setting	s Config Instance (hex)				
	ParamID	Name	Value	Datatype	Offset	Size [Bytes(.Bit
	9	SingleTurn	10	UDINT	0	4
	10	Operating_Parameterr	5	UINT	4	2
	11	TotalRange	100	UDINT	6	4
	12	Preset_Parameter	0	UDINT	10	4
	13	preset_changed	0	UDINT	14	4

Solution Explorer	<b>▼</b> ‡ ×	TwinCAT Project32	+ ×					
○ ○ 🏠 🛗 - Ĭo - @ 🗡 🗕		Name	[X]	Online	Туре	Size	>Addre	In/Out
Search Solution Explorer (Ctrl+ş)	ρ-	Fault Header		0x0000000a	DWORD	4.0	2.0	Input
Search Solution Explorer (Ctrl+ş)  Solution 'TwinCAT Project32' (1 project)  System MOTION System MOTION SAFETY SAFETY SAFETY SAFETY SAANALYTICS  Devices  Devices  Devices  Devices  Safety Box 1 (Els_V5_EXTENDED_CONFIG_DEMO)  Discupation Devices  Connection 1 (Input/Output)  Discupation Device D	- م -	<ul> <li>Pault Header</li> <li>Position Value</li> <li>Alarm Flag</li> <li>Warnin Flag</li> <li>Velocity Value</li> </ul>		20 0x00 0x00 -15	UDINT BYTE BYTE DINT	4.0 1.0 1.0 4.0	2.0 6.0 10.0 11.0 12.0	Input Input Input Input
Outputs Mappings								





#### **CHANGING PRESET PARAMETER**

When you need to set a pirtucular physical (mechanical) position as the starting point you should preset this position to achive this.

In this example we change the Preset\_Parameter as 100 to start from 100 counts. To do this we also set preset\_changed value as 1. As you can see below the new Position Value is 100

TwinCAT Project32 😕 🗙										
(	General Setting	s Config Instance Config Instance (hex)								
	ParamID	Name	Value	Datatype	Offset	Size [Bytes(.Bit				
	9	SingleTurn	262144	UDINT	0	4				
	10	Operating_Parameterr	0	UINT	4	2				
	11	TotalRange	1073741824	UDINT	6	4				
	12 Preset_Parameter		100	UDINT	10	4				
	13	preset_changed	1	UDINT	14	4				

TwinCAT Project32 👎	×					
Name	[X]	Online	Туре	Size	>Addre	In/Out
🔁 Fault Header		0x00040000	DWORD	4.0	2.0	Input
🔁 Position Value		100	UDINT	4.0	6.0	Input
🔁 Alarm Flag		0x00	BYTE	1.0	10.0	Input
🔁 Warnin Flag		0x00	BYTE	1.0	11.0	Input
🔁 Velocity Value		0	DINT	4.0	12.0	Input



#### **STORING PARAMETERS**

To Store parameters you should write 0x65766173 the signature which is actually "save" (evas).

In this example below we configure single turn as 10 and totalRange as 50 and scaling enabled by setting Operating\_Parameter to 4. To store all this parameter to be able to save after power down situations we set Store\_Parameters as 0x65766173.

Twir	TwinCAT Project32 🤹 🗶 Start Page										
G	General Settings Config Instance (hex)										
	ParamID	Name	Value	Datatype	Offset	Size [Bytes(.Bit	Help String				
	9	SingleTurn	10	UDINT	0	4					
	10	Operating_Parameterr	4	UINT	4	2					
	11	TotalRange	50	UDINT	6	4					
	12	Preset_Parameter	0	UDINT	10	4					
	13	preset_changed	0	UDINT	14	4					
	14	Store_Parameters	0x65766173	UDINT	18	4	0x65766173 The signature that shall be written is \"save\" (evas)				
	15	Restore_Parameters	0	UDINT	22	4	0x64616F6C The signature that shall be written is \"load\" (doal)				



After that we should click on Reload button to send this datas to our slave device in out case it is our encoder device.

Now our parameters saved inside of our Ethernet IP encoder. To test it we can restart the encoder by power down. After restart we should see the configurations from single turn and total turn values.

TwinCAT Project32	+ ×	Start Page			
Name	[X]	Online	Туре	Size	>Addre
🔁 Fault Header		0x0000000a	DWORD	4.0	2.0
Position Value		28	UDINT	4.0	6.0
🔁 Alarm Flag		0x00	BYTE	1.0	10.0
🔁 Warnin Flag		0x00	BYTE	1.0	11.0
Velocity Value		0	DINT	4.0	12.0



EtherNet/IP

#### **RESTORING PARAMETERS**

If we need to go back to the factory default configuration parameters we should restore the parameters. Click on Restore defaults button to get the default parameter values from the eds file. After that enter 0x64616F6C to Restore\_Parameters which is actually signature for "load" (doal).

ParamID	Name	Value	Datatype	Offset	Size [Bytes(.Bit.
9	SingleTurn	0x40000	UDINT	0x0	4
10	Operating_Parameterr	0x0	UINT	0x4	2
11	TotalRange	0x40000000	UDINT	0x6	4
2	Preset_Parameter	0x0	UDINT	0xA	4
3	preset_changed	0x0	UDINT	0xE	4
14	Store_Parameters	0x0	UDINT	0x12	4
14	Store_Parameters Restore_Parameters	0x0 0x64616F6C	UDINT	0x12 0x16	4
14	Store_Parameters Restore_Parameters	0x0 0x64616F6C	UDINT	0x12 0x16	4
14	Store_Parameters Restore_Parameters	0x0 0x64616F6C	UDINT	0x12 0x16	4
14	Store_Parameters Restore_Parameters	0x0 0x64616F6C	UDINT	0x12 0x16	4

# Reload button

Click on Reload button again to pass this info to our encoder. After that you can see the factory configuration like from below image.

TwinCAT Project32	4	×	Start Page			
Name		[X]	Online	Туре	Size	>Addre Linked to
📌 Fault Header			0x00040000	DWORD	4.0	2.0
🔊 Position Value			3375963	UDINT	4.0	6.0
🔁 Alarm Flag			0x00	BYTE	1.0	10.0
🔁 Warnin Flag			0x00	BYTE	1.0	11.0
📌 Velocity Value			0	DINT	4.0	12.0







#### 4. Connector & Pin Assignment

**Pin Assignment** 



**FCSF M1204** : M1204 Female Connector FCSF M1204 R200 : M1204 Female Connector with 2 meter cable

#### Counter Connector Part Number





www.fenac.com.tr