# Application Note Mitsubishi Compact PLC and GX IEC Developer

This document guides you through the setup of proprietary vendor specific software installed on you PC. Your supervisor may provide you with additional or alternative instructions.

The document consists of standard instructions that may not fit your particular solution. Please visit our support website for latest revisions of documentation and firmware:

http://www.secomea.com

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# **Prerequisites for This Guide**

The following guide will assist you to setup a remote and online connection to the Mitsubishi equipment placed on the customer site using your GX IEC Developer programming software.

You may be able to project the descriptions to other MELSoft applications, such as GX Works2 and FX Configurator, but these are not covered by this guide.

This guide may also work with other Mitsubishi PLCs than the FX3U compact series  $% \left( {{{\rm{S}}_{\rm{S}}}} \right) = {{\rm{S}}_{\rm{S}}} \left( {{{\rm{S}}_{\rm{S}}}} \right)$ 

Prerequisites for this guide are:

- You have an operational LinkManager installed on your PC with a LinkManager certificate that allows you to connect to the SiteManager agents.
- You have the Mitsubishi FX3U compact PLC and the GX IEC Developer software installed.
- You have the Mitsubishi device agent installed and configured on the SiteManager at the remote site, and there is access between the SiteManager and the PLC. (A Serial attached PLC must be configured with agent device type Serial or Ethernet+Serial on the SiteManager. A network attached PLC must be configured with agent device type Ethernet on the SiteManager).

If this is not the case, we kindly ask you to contact the person / department responsible within your own company or at the company responsible hereof.

# **System Overview**

The communication path is as follows:

**GX IEC Developer**  $\rightarrow$  **LinkManager**  $\rightarrow$  GateManager  $\rightarrow$  SiteManager  $\rightarrow$  PLC.

This guide will elaborate on the components marked with **bold**.

The following system overview depicts a SiteManager 3134 at the customer location.



The procedures in the following apply to any SiteManager model.



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# 1. Ethernet Connection

The following describes how to connect the GX IEC Developer to a Mitsubishi compact PLC equipped with a FX3U ENET module that is attached to a SiteManager via Ethernet.

1. Locate the agent that represents your TCPI/IP attached PLC. Click the text (that turns orange at mouse over) to connect to the PLC.



 You will not see any activity on it yet. This only starts when you connect to the PLC via your project (Make a note of the IP address of the PLC):

LinkManager secomea										(	1
	Disconnect Logout Services Sniffer ROOT.demo.Toplevel.EMEA.Denmark.CustomerF.Production Plant 1										
		٢	1itsubishi 16M*	(SiteMan	ager) -	192.168.3	3.1				
Connects Packets						By	tes				
	Agent		Address	status	ok	fail	tx	۳x	tx	rx	
	😳 🖌 Mitsubish	i16M* 192	2.168.3.1:5551	IDLE	0	0	0	0	0	0	

**Hint:** You are in princple now connected to the PLC, and you could make a ping to the PLC IP address.

3. Open your project. Check in the module configuration the setting of the FX3U ENET module, and select **Configure module**:

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Project Object Edit Iools Online Debug Yew Egtras Window Help         Project ICAsemple program UPD         ICAsemple progr	🔽 sample program UPDATED - GX IEC Developer	
Image: program UPDATED         Image: program UPDAT	Project Object Edit Tools Online Debug View Extras Window	Help
Simple program LPDATED         Project [c/sample program UPD]         Project [c/sample project projec]         Proje	🚰 🖬 🍜 🖪 🖇 🖬 📾 🗠 🗠 🖬 🞒 🦆 🏶 🛅	🛗 🐚 🎬 🕒 🚓 🏪 🔛 🚥 💷 💷
Project [C:\sample program UPD         Ithramy_Pool         Project [C:\sample program UPD         Ithramy_Pool         Project [C:\sample program UPD         Ithramy_Pool         Ithramy_Pool <t< th=""><th>sample program UPDATED</th><th></th></t<>	sample program UPDATED	
Module Configuration       Image: State Module Type       Module Name       Path for configuration file         Image: State Module Type       Module Name       Path for configuration file       Image: State Module Type         Image: State Module Type       Module Name       Path for configuration file       Image: State Module Type         Image: State Module Type       Image: State Module Name       Image: State Module State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type       Image: State Type         Image: State	Project [c:\sample program UPD.  Project [c:\sample program UPD. Project [c:\sample progra	
Slot       Module Type       Module Name       Path for configuration file         0       Ethemet       FX3U-ENET       C:\sample program\EthemetKonfig.fen         1       -       -       Slot         2       -       -       Slot         3       -       -       Slot         4       -       -       File         5       -       -       -         7       -       -       -         0       Configure me       Open settings       -         0       Configure me       -       -       -         0       Configure me       -       -       -         0       Configure me       -       -       -         0       -       -       -       -       -         0       -       -	Module Configuration	×
Image: Structure in the setting in	O*         Slot         Module Type         Module Name           O*         0         Ethernet         ▼         FX3U-ENET         ▼         C:\sar	Path for configuration file
3       V       File       Vew Help         4       V       File       Vew Help         5       V       File       Vew Help         6       V       Vew Help         0       Vew Help       Vew Help </th <th></th> <th>🄢 FX Configurator-EN C:\sample program\EthernetKonfig.fen - [Eth</th>		🄢 FX Configurator-EN C:\sample program\EthernetKonfig.fen - [Eth
5       •		File View Help
Module 0         Operational settings         Operational settings         Initial settings         Initial settings         Open settings         Router relay parameter         E-mail settings         Necessary setting( No setting / Already set )         Default         Set if it is needed( No setting / Already set )         Check         Online         Transfer setup       PLC remote operation         Diagnostics		Ethernet Module settings
Operational settings         Operational settings         Initial settings         Open settings         Open settings         Open settings         Router relay parameter         E-mail settings         Necessary setling( No setting / Already set )         Oefault         Set if it is needed( No setting / Already set )         Ohne         Transfer setup       PLC remote operation         Diagnostics		Module 0 🗸
Initial settings         OK       Cancel         Configure no         Open settings         Router relay parameter         E-mail settings         Necessary setting( No setting / Already set )         Default         Set if it is needed( No setting / Already set )         Ohne         Transfer setup       PLC remote operation         Diagnostics		Operational settings
UK       Cancel       Configure no         Router relay parameter       Router relay parameter         E-mail settings         Necessary setting( No setting / Already set )       Default         Set if it is needed( No setting / Already set )       Check         Online       Transfer setup       PLC remote operation         Diagnostics       Diagnostics		Initial settings
Router relay parameter         Router relay parameter         E-mail settings         Necessary setting( No setting / Already set )         Default         Set if it is needed( No setting / Already set )         Check         Online         Transfer setup       PLC remote operation         Diagnostics	B-ata OK Cancel Configure mo	Open settings
Image: Control and any and a setting of the settin	Lob Body [LD]	Router relay parameter
Necessary setting / Already set )       Default         Set if it is needed(       No setting / Already set )       Check         Online       Online         Transfer setup       PLC remote operation       Diagnostics		L'onnan stungs
Set if it is needed(No setting / Already set )     Check       Chine     Online       Ready     Transfer setup   PLC remote operation Diagnostics		Necessary setting( No setting / Already set ) Default
Image: Collice in the second secon		Set if it is needed( No setting / Already set ) Check
Ready Transfer setup PLC remote operation Diagnostics		Online
	Ready	Transfer setup PLC remote operation Diagnostics

4. Under Operational settings you find the IP address that is configured in the project

👫 FX Configurator-EN C: 🛛	sample program\Ethernet	Konfig.fen - [Eth 🔳 🗖 🔀
File View Help		
D 📽 🖬 😂		
Communication data code	Initial timing Do not wait for OPEN ( Con impossible at STOP time ) Always wait for OPEN ( Co possible at STOP time )	nmunications ommunication
IP address		Send frame setting
IP address	168 3 1	C IEEE802.3
	C Use t	ence confirmation setting he KeepAlive he Ping
	End Cancel	

It is always a good idea to check this before loading the project into the PLC and potentially overwrite a configured IP address.



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5. Select Online → Transfer Setup → Ports.



Set PC side I/F to "Ethernet board" and set PLC side I/F to "Ethernet module":



7. Double click "Ethernet module", and ensure that the IP address corresponds to the one connected to by LinkManager.

PLC side I/F detailed setting of Ethernet module								
PLC	FX3U-ENET	OK Cancel						
IP address C Host Name	192168 3 1 IP input format DEC							

8. You should now be able to perform a transmission test. If successful you are online.





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9. You can now also observe data traffic in the LinkManager:

Linkl secome	Manc	iger								(	1
Disconnect Logout Services Sniffer ROOT.demo.Toplevel.EMEA.Denmark.CustomerF.Production Plant 1											
			Mitsubishi 16M*	(SiteMan	ager) -	192.168.	3.1				
				Ch-h	Conn	ects	Pack	(ets	Byi	bes	
	Ag	lent	Address	status	ok	fail	tx	۳x	tx	rx	
	⊛* м	itsubishi 16M*	192.168.3.1:5551	IDLE	1	0	2	2	22	16	



# 2. Serial Connection

The following describes how to connect GX Developer to a Mitsubishi PLC that is attached to a SiteManager via a SC-09 RS232/RS422 converter cable for Melsec FX and A.

1. Locate the agent that represents you serial attached PLC. Click the text (that turns orange at mouse over) to connect to the PLC.

🔥 LinkManager Console - Show technician @ Acco	🦄 🔻 🔝 👻 🚍 🖶 🔻 Page 🖛 S	Safety ▼ Tools ▼ 🕢 ▼ 🎽
LinkManager sectmea		<u></u>
Logout Services	Sniffer Refresh	
ROOT.demo.Toplevel.EMEA.Dem	mark.CustomerF.Production Plant 2	
ROOT demo Toplevel Accounts FEMEA Denmark Production Plant 1 Production Plant 2 Denverf Production Plant 2 Denverf Denverf Production Plant 2 Denverf Den	Mitsubishi 16M* (SM3129-Black,HKKD Show all Refresh	smain.dk)
; javascript:doACT(a1);	😜 Internet   Protected Mode: Off	📲 🔻 🔍 100% 🔻 🖉

2. When connecting, you should after a few seconds see some activity in the tray icon area, which is the auto-configuring of a virtual COM port driver facilitated by the LinkManager.

If your SiteManager, and PLC are correctly attached, you should also see the status of the agent become OK, and a few bytes of data traffic:

LinkManager secomea										
	Disconnect Logout Services Sniffer ROOT.demo.Toplevel.EMEA.Denmark.CustomerF.Production Plant 2									
	Mitsubishi 16M* (\$M3129-Black.HKKDomain.dk)									
	Connects Packets							Bytes		
	ok fail tx rx								rx	
	📣 Mitsubishi 16M*	135.0.0.128:23> 127.0.0.1	UP:1	1	0	з	2	63	63	

3. Now right click the LinkManager system tray Icon, and select **Status**. Make note of the Serial port that has been assigned (in this case COM3):

Serial port emulation: COM3:135.0.0.128:23 9600,7e1 RTS/CTS [Mitsubishi 16M*]	
[	ОК

Right click the LinkManager system tray icon again, and select **Options**. Enter the number of the COM port you found under status. This will ensure that you will always get this port in the future.



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Note that if you set or change the COM port setting you must Stop and Start the LinkManager for the changes to take effect.

Options	
COM port	Net Type C Bridged
ОК	Cancel

**Hint:** You can also force another COM port (e.g. COM2). Just ensure in your Windows device manager, that the port is not conflicting with an existing COM port. See Appendix A for info on how to organize COM ports.

4. Open GX IEC developer and unfold **Parameter** and double click the PLC/SPS icon to enter FX parameters and select **PLC system(2)**.

When first entered, the "Operate communication settings" (1) may not be enabled. Enabling it will fill default serial communication values (7bit, Even, 1bit, 9600). You can leave these, as the LinkManager/SiteManager will autodetect these settings (based on support of RFC 2217)

FX parameter	$\mathbf{X}$
Memory capacity Device PLC name 1/0 assignment F	PLC system(1) PLC system(2) Positioning
CH1 If the box is not checked, t Operate communication D8120 values in the PLC n D8120 values in the PLC n	he parameters will be cleared. stered to the communication board, parameters and nust be cleared upon program transfer.)
Protocol Non-procedural	Control line
2 Data length 7bit	H/w type 3 Regular/RS-232C 🗨
Parity Even	Control mode
Stop bit	Sum check
Transmission speed 9600  (bps)	Transmission control procedure Form1(without CR,LF)
T Header	Station number setting 00 H (00H0FH)
Terminator	Time out judge time 1 ×10ms (1255)
Default	Check End Cancel

**Hint:** For more info on these settings visit <u>www.mitsubishi-automation.com</u> and search for the document "Communication Manual" art. no.168594 (Japanese art. no. JY997d16901)

5. Select Online → Transfer Setup → Ports.

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6. Set PC side I/F to "Serial USB" and set PLC side I/F to "PLC module":

Transfer Se	tup				
PC side I/F	Serial USB	CC IE Cont NET/10(H) board	NET(II) board	CC-Link board	<u>Ethernet</u> board
	сом Сом 1	Transmission	speed 9.6Kbp	28	
PLC side I/F	PLC module	CC IE Cont NET/10(H) module	MNET(II) module	CC-Link module	Ethernet module

7. Double click "Serial/USB", and ensure that the COM port is set to the COM port used by the LinkManager. It is recommended to lower the transmission speed (e.g. to 9.6Kbps) to ensure a stable communication.



**Note:** If you run GX Developer inside VMWare, you should set the port to the default COM port of the client OS, which is typically **COM1** (<u>Not</u> the COM port that the VMWare Virtual Machine Settings defines as the physical port, and which is also the one used in the LinkManager)

**Hint:** It should not be necessary to alter the serial communication settings under **Setup**, as the LinkManager/SiteManager will auto-detect these settings (based on support of RFC 2217). You can verify the current settings by right clicking the LinkManager icon and select Status (only visible when LinkManager is connected to the Serial PLC):





8. You should now be able to perform a transmission test. If successful you are Online.

2	Pl Cmode	FXCPU
	GX IEC Developer 7.04	
	<b>(</b> ) Successfully connected with the FX3U(C)CPU.	
		Connection channel list
s	ок	PLC direct coupled setting
_	Retry times 0	Connection test

**Hint:** You will also notice that the LinkManager counters will show the traffic. This will give an indication of the amount of data transferred:

🕁 LinkManager Console - S	how technician @ A	🕯 - 🖻	] - 🗆	-	Page 🔻	Safety 🔻	Tools 🔻	<b>?</b> ▼ "
LinkManager								
Disconnect Logout Services Sniffer ROOT.demo.Toplevel.EMEA.Denmark.CustomerF.Production Plant 2								
	Mitsubishi 16M* (SM312	9-Black.H	KKDom	ain.dk)				
Agent	Mitsubishi 16M* (SM312 Address	9-Black.H Status	KKDom Conn	ain.dk) ects	Pacl	:ets	Bytes	
Agent	Mitsubishi 16M* (SM312 Address	9-Black.H Status	KKDom Conn ok	ain.dk) ects fail	Pack tx	iets rx	Bytes tx	PX

**Note:** You may be able to increase the transmission speed in the PC side I/F Serial settings and still get a successful connection test. In order to verify a proper speed, you should verify by uploading or downloading a project.



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## 3. Ethernet connection via WindowsXP under VMWare

You can run the GX IEC Developer software inside a VMWare engine, to a Mitsubishi compact PLC that is Ethernet attached to a SiteManager.

**Note:** LinkManager must be installed on the hosting machine, and <u>NOT</u> inside the VMWare Windows XP image. LinkManager cannot run inside a VMWare virtual machine.

The following illustrates VMWare Player, which can be downloaded from <a href="http://www.vmware.com/support/product-support/player/">http://www.vmware.com/support/product-support/player/</a>

9. Locate your WindowsXP that has GX IEC Developer installed, and enter **Edit** virtual machine settings.

🤫 VMware Player File + VM + Help +	_ ×
Windows XP Professional 2	- X Windows XP Professional 2
	State: Powered Off OS: Windows XP Professional Version: Workstation 5.x virtual machine RAM: 1024 MB
	<ul> <li>Play virtual machine</li> <li>Edit virtual machine settings</li> </ul>
	🗐 <b>vm</b> ware

10. Make sure the Network Adapter settings is set to NAT:





1024 MB 1 8 GB (Preallocated) Auto detect Using drive A: NAT Present Using oort COM6	Connected Connect at power on Network connection Bridged: Connected directly to the physical network Replicate physical network connection state
1 8 GB (Preallocated) Auto detect Using drive A: NAT Present Using opert COM6	Connect at power on  Network connection  Bridged: Connected directly to the physical network  Replicate physical network connection state
8 GB (Preallocated) Auto detect Using drive A: NAT Present Using port COM6	Network connection Bridged: Connected directly to the physical network Replicate physical network connection state
Using drive A: NAT Present Using port COM6	Bridged: Connected directly to the physical network     Replicate physical network connection state
NAT Present Using port COM6	Replicate physical network connection state
Present Using port COM6	
Using port COM6	NAT: Used to share the host's IP address
	Host-only: A private network shared with the host

- 11. Start the VMWare engine and on the host PC start LinkManager.
- 12. Follow the procedure of section **1. TCP Ethernet Access** to get access to the PLC via LinkManager



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# 4. Serial connection via WindowsXP under VMWare

You can run the GX IEC Developer software inside a VMWare engine, to a Mitsubishi compact PLC that is Serial attached to a SiteManager.

**Note:** LinkManager must be installed on the hosting machine - and <u>NOT</u> inside the VMWare Windows XP image. LinkManager cannot run inside a VMWare virtual machine.

The following illustrates VMWare Player, which can be downloaded free of charge from <a href="http://www.vmware.com/support/product-support/player/">http://www.vmware.com/support/product-support/player/</a>

- 1. Follow step 1-3 of section **2. Serial Connection** on page 8. This will create a COM port even if the PC does not have a physical COM port.
- 2. Locate your Windows XP that has GX IEX Developer installed, and without starting it, enter **Edit virtual machine settings**.



3. Add Serial Port to the Hardware list (if it does not already exist).



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Virtual Machine Sett Hardware Options Device Memory Processors Hard Disk (IDE) S CD/DVD (IDE)	Summ 1024 1 B GB Auto	do you want to install?
Ⅰ       Floppy         ■ Network Adapter         ● USB Controller	Using NAT Prese Hard Disk © CD/DVD Drive Ploppy Drive Ploppy Drive Wetwork Adapter © USB Controller © USB Controller © Serial Port © Generic SCSI Device	Explanation Add a serial port.
		< Back Next > Cancel
	Add Remove	OK Cancel Help

4. Select "Use physical port" (Even though LinkManager makes a virtual COM port, VMWare sees it as a physical port)

Add Hardware Wizard	×
Serial Port Type What media should this serial port access?	
Serial port	
Ouse physical serial port on the host	
Output to file	
Output to named pipe	
< Back Next > Cancel	

5. Set the port to the COM port used by the LinkManager (see section **2. Serial Connection** on page 8)



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tual Machine Setting	s	
lardware Options		
Device	Summary	Device status
Memory	256 MB	Connected
Processors	1	Connect at power on
🛁 Hard Disk (IDE)	4 GB	Connection
SCD/DVD (IDE)	Using drive F:	
💾 Floppy	Using drive A:	Use physical serial port:
Network Adapter	NAT	СОМЗ
	Present	O (Auto detect (COM3)
Sound Card	Auto detect	COM1 COM3
w Jenar Purt	Using port COM3	
		Use named pipe:

- 6. If VMWare does not allow you to add a Serial port, it may be because the PC does not have a physical Serial port.
- 7. Press **OK** twice, and select the Select **Finish** and **OK**, Start the VMWare WindowsXP image, and start the GX IEC Developer software.
- 8. Follow the procedure described in section **3 Serial Access** on getting access to the PLC via LinkManager.

**Note:** VMWare will typically make the physical COM port of the host system (e.g. COM3) appear to the virtual OS as COM1. You should configure the GX IEC Developer to use the port of VMWare (COM1) and not the physical port of the host system (COM3) that is used by LinkManager.

#### 4.1. Startup order of VMWare, LinkManager and GX Developer

If you have already preset a COM port in LinkManager as well as in VM-Ware, the startup order would be irrelevant. You can stop and start the components individually.

If you encounter problems, or you have changed the COM port setting of LinkManager it is recommended to do the following:

- 1. Stop the VMWare engine.
- 2. Stop LinkManager completely.
- 3. Start LinkManager.
- 4. Connect to the Serial PLC and check the assigned COM port under Status (by right-clicking the LinkManager tray icon)
- 5. Check the COM port settings of the Virtual Machine Settings of the Windows image with the GX Developer software.
- 6. Start the VMWare image.
- 7. Start GX Developer and connect to the PLC



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# Appendix A, Organizing COM ports in Windows

#### Clean up Windows Registry for redundant COM ports:

You may want to use a lower COM port number. In case your PC assigns a COM port of e.g. 13, it may be due to previous installs of virtual COM ports from in relation to installation of other programs.

You can clean your PC for redundant COM ports in Windows registry:

- 1. Open regedit (Start  $\rightarrow$  run  $\rightarrow$  Regedit)
- 2. Navigate to:

# HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\COM Name arbiter

- 3. In the ComDB set all values to 00
- 4. Restart your PC

#### Enable LinkManager to use COM1:

If you prefer the COM port to be COM1:

Even if no COM ports are installed on the PC, Windows will never assign a COM port lower than COM3 to the LinkManager. You therefore have to do the following to force LinkManager to use COM1:

- Open Windows Control Panel → System → Hardware → Device Manager → Ports (COM & LPT).
- 2. If there already are physical COM ports listed, you must re-assign the port numbers to free up COM1.

Right click a COM port and select Properties  $\rightarrow$  Port Settings  $\rightarrow$  advanced

- 3. Change the COM port number in the drop down list.
- 4. Restart your PC.
- 5. Right click the LinkManager system tray icon and select Options.
- 6. Enter 1 in the COM port field.

Options	
COM port	Net Type C Bridged C NAT
ОК	Cancel

7. Stop and Start the LinkManager and start the Serial agent.



# Appendix B, Tips on verifying and setting the PLC IP address

#### Using the default IP of the PLC

If you have not configured the IP address on the PLC yet, you can choose to just use the factory default address 192.168.1.254/255.255.255.0, and configure the DEV port on the SiteManager to use the same subnet.

The subnet mask reflect a class C subnet, and require that the DEV ports first 3 numbers (192.168.1) must be the same as that of the PLC, while the last number must be different (.e.g 192.168.1. $\underline{2}$ ), and must not be the same as any other TCP/IP device in the network.



**Note:** If you are using a SiteManager model 3134 you have 4 DEV ports which can be configured with individual subnets. So you can choose to just connect the PLC directly to e.g. DEV2 which you have assigned an IP address in the same subnet as the PLC's default IP address.

#### Verifying the PLC IP address.

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Version: 1.0, March 2011

If you do not know the IP address of the PLC and you do not have the project where it is defined in, you can use the CPU programming port and look inside the Ethernet module buffer memory with CX IEC Developer. BFM 0 + BFM 1 hold a 32 bit word in hex, which is the current IP address of the module.



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