ONLINE-HELP

Flexi Soft Ethernet IP: Implicit Messaging with a Omron PLC

Flexi Soft Gateways

GB

SICK
Sensor Intelligence.

Contents

1 About this Online Help

This Online Help describes the integration from FX0-GENT into a OMRON PLC by Implicit Messaging

1.1 Hardware used:

- OMRON SPS: SYSMAC CJ2M-CPU33 (with integrated EtherNet/IP Port CJ2M-PEIP21)
- FX0-GENT as of version V2.00.0 (SICK number 1044072)

1.2 Software used:

- OMRON CX-one, CX-Programmer Version 9.31
- OMRON Network Configurator Version 3.22
- Flexi Soft Designer v1.4

2 Preparation

2.1 Download driver

You will find the EDS files and the device icon for PLC interfacing:

- in the Internet on the Flexi Soft Gateway product page on www.sens-control.com.
- in the Flexi Soft Designer program folder on your hard disk (default installation folder is “C:\programs\SICK\FlexiSoft\DeviceDescriptions\...”)

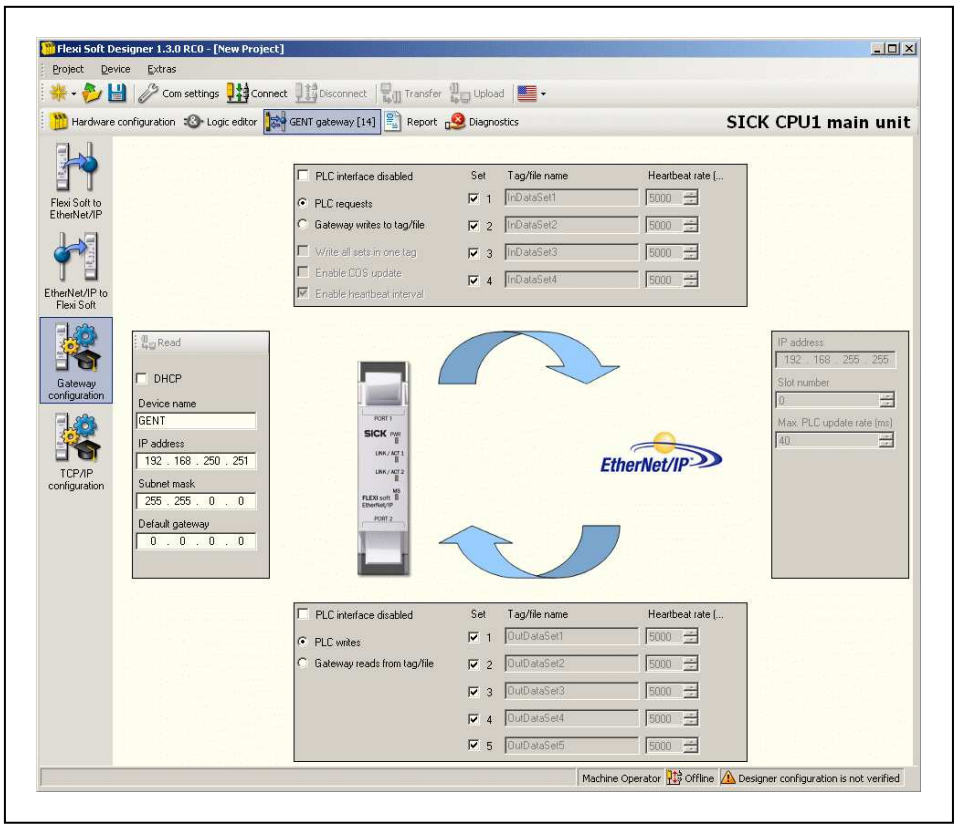
3 Basic configuration

3.1 Assigning a device name and IP address

Configuration of the FX0-GENT is performed via the Flexi Soft Designer tool

- Open the Flexi Soft Designer and load the hardware configuration including the EtherNet/IP gateway
- Click on the **Gateways** button above the main window and select the FX0-GENT or double click the FX0-GENT in the hardware configuration to open the gateway configuration dialog
- Click on Gateway configuration on the left hand menu. The following dialog appears:

EtherNet/IP gateway configuration dialog



- If desired, change the **Device name** for the Flexi Soft gateway
- Enter a valid **IP address** for the Flexi Soft gateway, and if required a valid **Subnet mask** and a valid IP address for **a Default gateway**
- Click **Connect** to go online and download the configuration to the Flexi Soft system

3.2 Basic configuration of the PLC using CX-Programmer

- Set up a project in CX-Programmer for your PLC (e.g. CJ2M-CPU33) and assign the correct IP address to the EtherNet/IP interface. For more information, please refer to the software manual or to the online help of CX-Programmer

3.3 Projecting the network variables

- Open the CX-Programmer **Symbol Table** and right click to open the context menu
- Choose the command **Insert symbol** to create a new symbol
- Create two variables in the CX-Programmer **Symbol Table**. For example, if 50 byte input data and 10 byte output data shall be transferred, create the following variables:
  - **GENT_IN_50** for data from the EtherNet/IP gateway to the PLC (size: 50 byte or 25 words)
  - **GENT_OUT_10** for data from the PLC to the EtherNet/IP gateway (size: 10 bytes or 5 words)
- Go online and download the program to your PLC

3.4 Direct settings on the PLC

- Set the Unit No. on the selector switch (here: 0)
- Set the double digit **Node No.** in hex format on the selector switches. The Node No. Is the same as the last number of the PLC's IP address. E.g. if the IP address of the PLC is 192.168.0.20, then the Node No. is 20 or 0x14

3.5 Installing the EDS file using Network Configurator

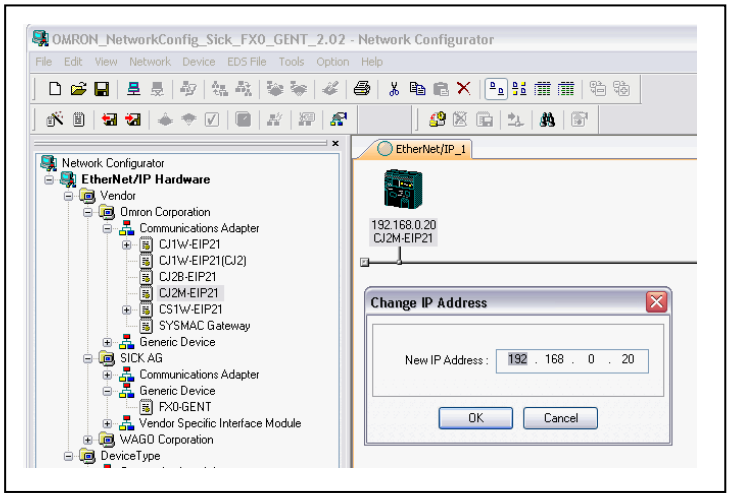
- Download the EDS file **SICK_FX0_GENT_2.02.eds** from www.sens-control.com, on the FX0-GENT product page. You will find this EDS file also in the Flexi Soft Designer program folder on your hard disk if you have Flexi Soft Designer version 1.4.0 or higher (the default installation folder is „C:\programs\SICK\FlexiSoft\DeviceDescriptions\...")
- In the OMRON Network Configurator open the **EDS file** menu and choose the **Install** command
- Follow the instructions in the online help or in the user manual of the Network Configurator for installing EDS files

4 Network connection

4.1 Adding the PLC's EtherNet/IP interface to the network

- Double click on the CJ2M-EIP21 in the device selection window to add the device to the configuration
- Right click on the device and select the **Change Node Address** command from the context menu
- Enter the PLC's IP address (e.g. 192.168.0.20) and click **OK**

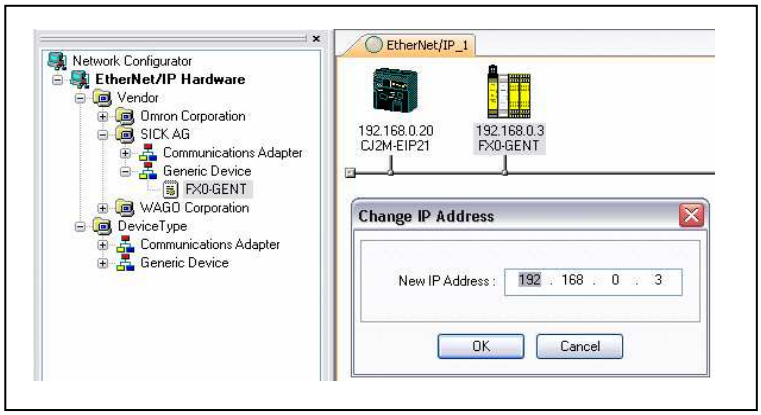
Setting the IP address for the PLC



4.2 Adding the gateway to the network

- Double click on the FX0-GENT in the device selection window to add the gateway to the configuration
- Right click on the gateway and select the Change Node Address command from the context menu
- Enter the gateway's IP address (e.g. 192.168.0.3) and click OK. See section 3.1 "Basic configuration — assigning a device name and IP address" how to set the IP address for the gateway

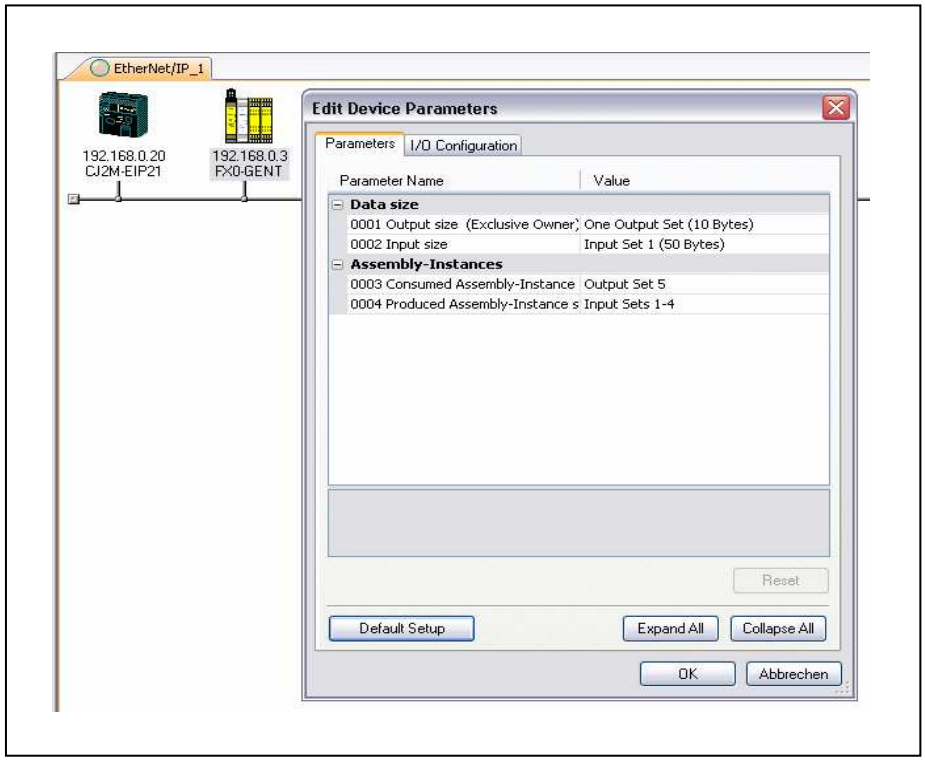
Setting the IP address for the gateway



4.3 Defining the data to be read from and written to the gateway

- Double click on the gateway to open the Edit Device Parameters window

Edit the gateway device parameters



The following parameters can be set:

Gateway device parameters for input data and output data

Parameter name	Description	Possible values
Output size	Number of bytes to be transferred from the PLC to the gateway	0001 Output size (Exclusive Owner) — Five Output Sets (50 Bytes) 0002 Input size **Assembly-Instances** 0003 Consumed Assembly-Instance 0004 Produced Assembly-Instance s NoOutputData One Output Set (10 Bytes) Two Output Sets (20 Bytes) Three Output Sets (30 Bytes) Four Output Sets (40 Bytes) Five Output Sets (50 Bytes)
Input size	Number of bytes to be transferred from the gateway to the PLC	0002 Input size — Input Sets 1-4 (202 Bytes) **Assembly-Instances** 0003 Consumed Assembly-Instance 0004 Produced Assembly-Instance s Input Set 2 (32 Bytes) Input Set 1 (50 Bytes) Input Set 3 or 4 (60 Bytes) Input Sets 1-2 (82 Bytes) Input Sets 2-3 (92 Bytes) Input Sets 3-4 (120 Bytes) Input Sets 1-3 (142 Bytes) Input Sets 2-4 (152 Bytes) Input Sets 1-4 (202 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	0003 Consumed Assembly-Instance — Output Sets 1-5 0004 Produced Assembly-Instance s Output Sets 1-5 Output Sets 2-5 Output Sets 3-5 Output Sets 4-5 Output Set 5
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	0004 Produced Assembly-Instance s — Input Sets 1-4 Input Sets 1-4 Input Sets 2-4 Input Sets 3-4 Input Set 4

In the example shown on Page 9, input data set 1 (50 bytes) is read from the gateway and output data set 1 (10 bytes) is written to the gateway. See following Table:

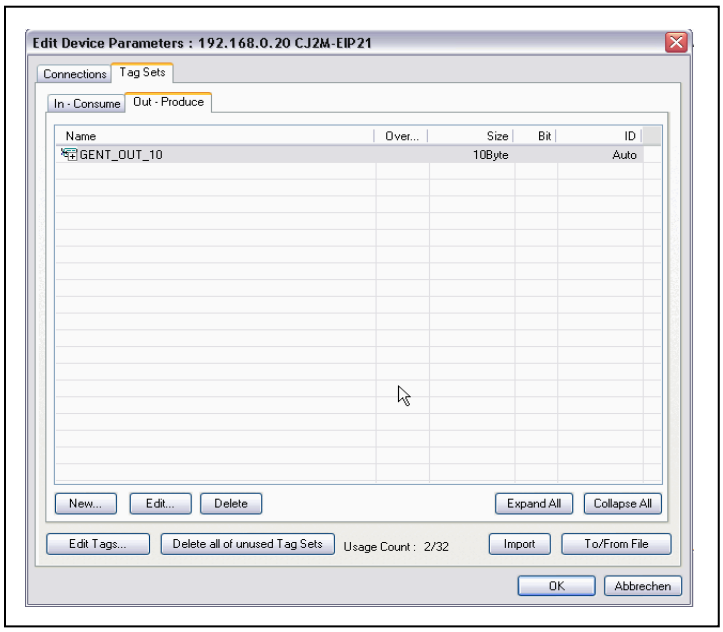
Assembly object instance definitions

Assembly instance no.	Description	Data type	Data values	Access rule	Corresponding Full Data Transfer object attributes
Flexi Soft to Network					
1	Request input data sets 1 to 4 data	BYTE[202] Valid read lengths: 1-202	0-255	Get	1, 2, 3, 4
2	Request input data sets 2 to 4 data	BYTE[152] Valid read lengths: 1-152	0-255	Get	2, 3, 4
3	Request input data set 3 and 4 data	BYTE[120] Valid read lengths: 1-120	0-255	Get	3, 4
4	Request input data set 4 data	BYTE[60] Valid read lengths: 1-60	0-255	Get	4
Network to Flexi Soft					
5	Write output data set 1 to 5 data	BYTE[50] Valid write lengths: 10 = Set 1 20 = Sets 1-2 30 = Sets 1-3 40 = Sets 1-4 50 = Sets 1-5	0-255	Get/Set	5, 6, 7, 8, 9
6	Write output data sets 2 to 5 data	BYTE[40] Valid write lengths: 10 = Set 2 20 = Sets 2-3 30 = Sets 2-4 40 = Sets 2-5	0-255	Get/Set	6, 7, 8, 9
7	Write output data sets 3 to 5 data	BYTE[30] Valid write lengths: 10 = Set 3 20 = Sets 3-4 30 = Sets 3-5	0-255	Get/Set	7, 8, 9
8	Write output data sets 4 and 5 data	BYTE[20] Valid write lengths: 10 = Set 4 20 = Sets 4-5	0-255	Get/Set	8, 9
9	Write output data set 5 data	BYTE[10] Valid write lengths: 10 = Set 5	0-255	Get/Set	9

4.4 Importing the network variables from the PLC project into the Network Configurator

- Make sure that only the related CX-Programmer project is open
- Double click the **CJ2M-EIP21** in the Network Configurator to open its **Edit Device Parameters** window

Importing the network variables

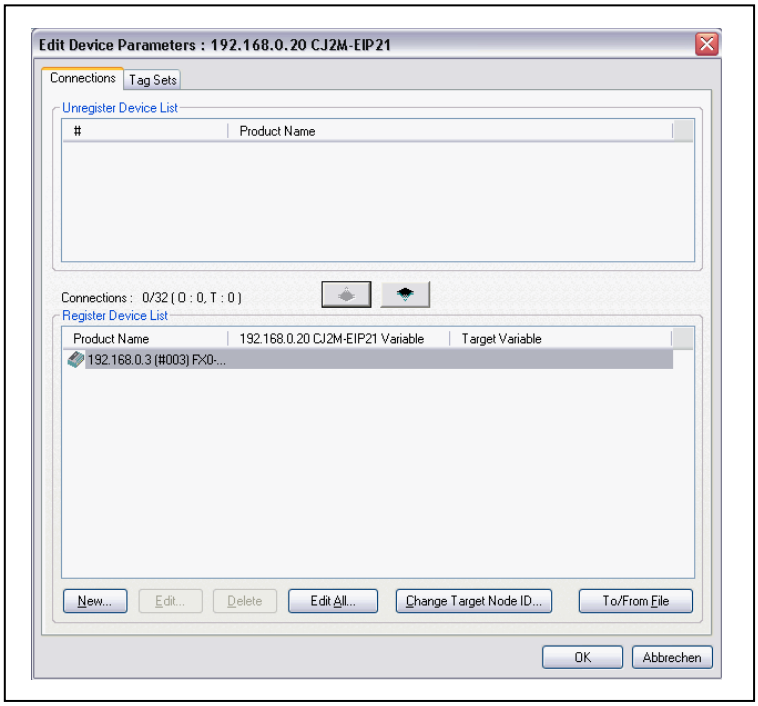


- Click on the **Import** button and import the PLC network variables created in the CXProgrammer project (e.g. **GENT_IN_50 and GENT_OUT_10**)

4.5 Assigning the gateway input and output data to the PLC network variables

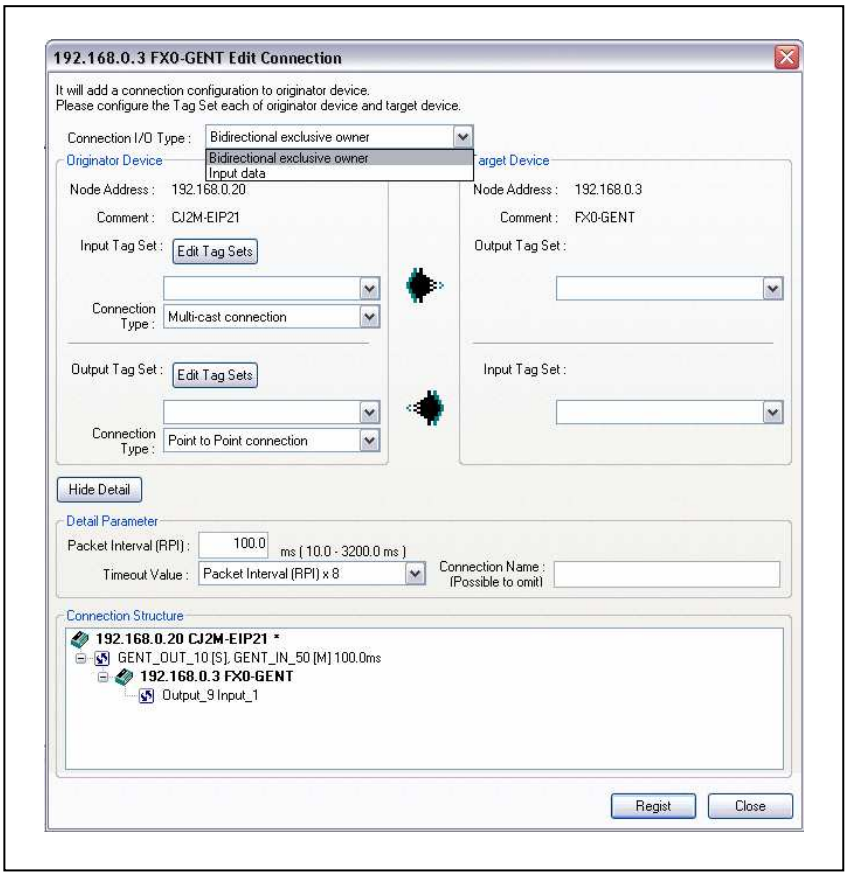
- Switch to the **Connections** file card of the **Edit Device Parameters** window of the **CJ2M-EIP21**

Edit the device parameters



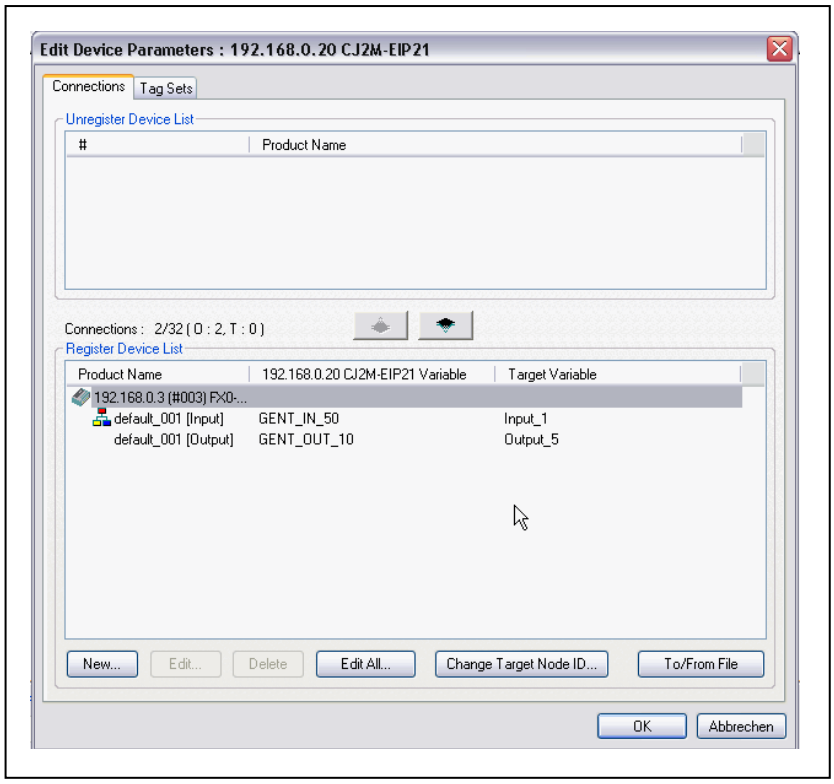
- Double click on the EtherNet/IP gateway in the **Register Device List** (in this case 192.168.0.3). The **Edit Connection** window opens

Edit the connection parameters



- Set the **Connection I/O Type** to **Bidirectional exclusive owner**
- Under **Originator Device**, select the PLC network variables from your CX-Programmer project for the **Input Tag Set** (e.g. **GENT_IN_50**) and for the **Output Tag Set** (e.g. **GENT_OUT_10**)
- Under **Target Device**, select the **Output Tag Set** and the **Input Tag Set** that have been defined for the FX0-GENT as shown in the picture on page 9
- For the **Packet Interval (RPI)**, enter a value that conforms to the requirements of your system. Please refer to the sections **“Packet update interval”** and **“Bandwidth limitations”** in chapter 4.5.1 and 4.5.2
- Click on **Regist** to register the configuration
- Click on **Close** to return to the **Edit Device Parameters** window

Registered connection



- Click on **OK**

4.5.1 Packet update interval

The packet update interval for Class 1 connections that will be returned to the EtherNet/IP PLC in the Forward Open response depends on the following factors:

- the value for the **Requested Packet Interval** received from the EtherNet/IP PLC in the Forward Open message
- the **Maximum PLC Update Rate** as configured in the **Gateway configuration** dialog of the Flexi Soft Designer
- the 10 ms system clock that the EtherNet/IP gateway operates on

If the Requested Packet Interval is less than the Maximum PLC Update Rate, the packet update interval will be set to the Maximum PLC Update Rate. Otherwise, it will be set to theRequested Packet Interval.If the packet update interval is not a multiple of 10 ms (10, 20, 30, 40, etc.), then the packet update interval will be adjusted up to the next multiple of 10 ms.

Examples for the packet update interval

Requested Packet Interval	Maximum PLC Update Rate	Actual packet update interval	Description
5 ms	10 ms	10 ms	Set to Maximum PLC Update Rate
10 ms	10 ms	10 ms	Requested Packet Interval accepted
15 ms	20 ms	20 ms	Set to Maximum PLC Update Rate
15 ms	10 ms	20 ms	Requested Packet Interval adjusted upward to 20 ms
20 ms	25 ms	30 ms	Maximum PLC Update Rate adjusted upward to 30 ms
40 ms	30 ms	40 ms	Requested Packet Interval accepted
32 ms	30 ms	40 ms	Requested Packet Interval adjusted upward to 40 ms
48 ms	40 ms	50 ms	Requested Packet Interval adjusted upward to 50 ms
50 ms	40 ms	50 ms	Requested Packet Interval accepted

4.5.2 Bandwidth limitations

The maximum number of Class 1 messages per second is limited by the Flexi Soft CPU. At 50% of available CPU bandwidth, this is approximately 200 messages per second or one Class 1 connection at 10 ms I/O update rate (the system clock frequency of the FX0-GENT is 10 ms).

Recommended bandwidths for Class 1 messages

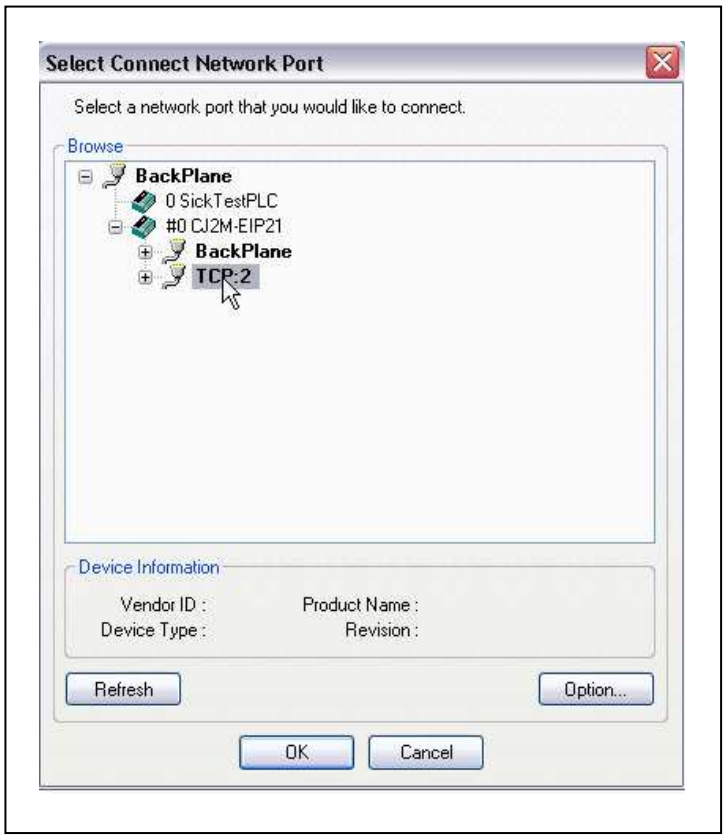
PLC update rate (ms)	Cyclic two-way I/O connections	Cyclic input-only multicast connections
10	1	2
20	2	4
40	Up to 4	Up to 8

NOTE: The gateway will not enforce these bandwidth recommendations. However, if the bandwidth used for Class 1 communication exceeds 200 messages per second, the RS-232 interface and the Ethernet TCP/IP interface will slow down.

5 Transferring the configuration

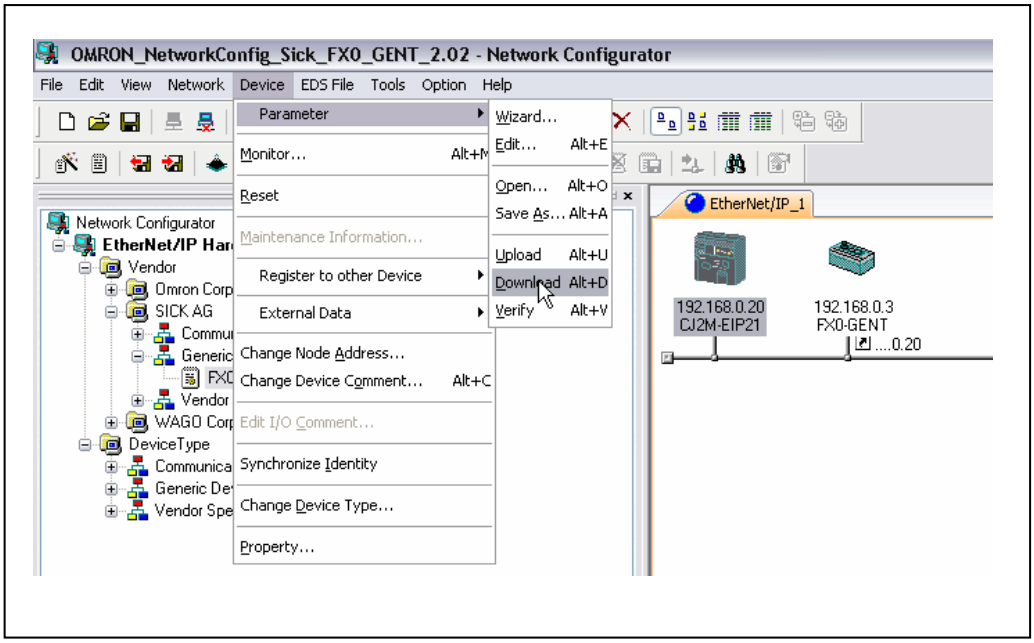
- In the **Network** menu select the **Connect** command. The **Select Connect Network Port** window opens

Selecting a network port



- In the device tree select **TCP:2**, then click **OK**

Downloading the configuration to the PLC



- In the Network Configurator, select the CJ2M-EIP21. Then, in the **Device** menu open the **Parameter** submenu and select the **Download** command

6 Class 1 connection parameter examples

This section shows examples for the **Input Tag Sets** or **Output Tag Sets** that are required in order to get different input data sets and set different output data sets. See page 9.

Get all input data sets and set all output data sets

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	Five Output Sets (50 Bytes)
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Sets 1-4 (202 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Output Sets 1-5
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

Get input data set 1 and set output data set 1

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	One Output Set (10 Bytes)
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Set 1 (50 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Output Sets 1-5
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

Get input data set 2 and set output data set 3

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	One Output Set (10 Bytes)
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Set 2 (32 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Output Sets 3-5
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 2-4

Get input data sets 1 and 2 and set output data sets 1 and 2

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	Two Output Sets (20 Bytes)
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Sets 1-2 (82 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Output Sets 1-5
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

Get input only data set 1

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Set 1 (50 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

Get input only data set 2

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Set 2 (32 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 2-4

Get input only data set 3

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Set 3 or 4 (60 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Set 3-4

Get input only data set 4

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Set 3 or 4 (60 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Set 4

Get input only data sets 1 and 2

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Sets 1-2 (82 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

Get input only data sets 2 and 3

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Sets 2-3 (92 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 2-4

Get input only data set 1, 2 and 3

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Sets 1-3 (142 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

Get input only data sets 1 to 4

Parameter name	Description	Value
Output size (Exclusive Owner)	Number of bytes to be transferred from the PLC to the gateway	NoOutputData
Input size	Number of bytes to be transferred from the gateway to the PLC	Input Sets 1-4 (202 Bytes)
Consumed Assembly Instance	Assembly instance number for data from the PLC to the gateway (output data sets)	Any value
Produced Assembly Instance	Assembly instance number for data from the gateway to the PLC (input data sets)	Input Sets 1-4

7 Diagnostics and troubleshooting

For information how to perform diagnostics on the Flexi Soft system please refer to theoperating instructions for the Flexi Soft Designer software (SICK part no. 8012998).

Troubleshooting for the FX0-GENT

Error	Possible cause	Possible remedy
The Flexi Soft Designer tool does not connect to the Flexi Soft gateway module	FX0-GENT has no power supply. FX0-GENT is not in the same physical network as the PC. The PC is configured to another subnet mask in the TCP/IP settings. FX0-GENT has already been configured once and has a fixed set IP address or an IP address assigned by a DHCP server that is not recognised.	Establish the power supply. Check the Ethernet wiring and network settings on the PC and correct if necessary. Set the subnet mask on the PC to 255.255.0.0 (factory setting of the FX0-GENT). Check the communication settings in the Flexi Soft Designer.
FX0-GENT does not supply any data. LED PWR ● Green LED LINK/ACT ●/☼ Green LED STATUS[8] ☼ Red/green	FX0-GENT is configured for data transfer to PLC, but Ethernet communication is not yet established or faulty. Duplicate IP address detected. Another device on the network has the same IP address.	Minimum one Ethernet connection needs to be established. Set up Ethernet connection on PLC side, check Ethernet cabling, check Ethernet connection settings on PLC and in the Flexi Soft Designer. If no Ethernet communication is required, disable the Ethernet connections/PLC interfaces on the FX0-GENT. Adjust IP address and power cycle device.
FX0-GENT does not supply any data. LED PWR ● Green LED LINK/ACT ●/☼ Green LED STATUS[8] ☼ Red (1 Hz)	Configuration required. Configuration download is not completed.	Configure the FX0-GENT and download the configuration to the device. Wait until the configuration download has been completed.
FX0-GENT does not supply any data. LED PWR ● Green LED LINK/ACT ●/☼ Green LED STATUS[8] ● Green	No data set is activated. No Ethernet communication interface is enabled.	Activate at least one data set.
FX0-GENT does not supply any data. LED PWR ● Green LED LINK/ACT ●/☼ Green LED STATUS[8] ☼ Green (1 Hz)	FX0-GENT is in Idle mode.	CPU/application is stopped. Start CPU (change into Run mode).
FX0-GENT functioned correctly after configuration, but suddenly no longer supplies data. LED PWR ● Green LED LINK/ACT ●/☼ Green LED STATUS[8] ☼ Red/green	FX0-GENT is operated in slave mode, the IP address is assigned from a DHCP server. After the FX0-GENT or the DHCP server has been restarted, a different IP address that is unknown to the PLC has been assigned to the FX0-GENT.	Either assign a fixed IP address to the FX0-GENT, or reserve a fixed IP address for the FX0-GENT in the DHCP server (manual assignment by means of the MAC address of the FX0-GENT).
FX0-GENT/Flexi Soft system is in Critical fault mode. LED PWR ● Green LED LINK/ACT ☼ Green LED STATUS[8] ● Red	FX0-GENT is not plugged properly into the other Flexi Soft module. Module connecting plug is soiled or damaged. Other Flexi Soft module has internal critical error.	Plug the FX0-GENT in correctly. Clean the connecting socket/plug. Repower the system. Check the other Flexi Soft modules.
FX0-GENT is in Critical fault mode. LED PWR ● Green LED LINK/ACT ●/☼ Green LED STATUS[8] ☼ Red (2 Hz)	FX0-GENT internal device error CPU firmware version does not support Flexi Soft gateways.	Switch off the power supply of the Flexi Soft system and switch it on again. Check the diagnostics messages with the Flexi Soft Designer. Use a CPU with the required firmware version (see section 2.2 “Correct use” on page 9). If the error remains, replace the gateway.

Symbol description:
○: LED is off. ● Green: LED lights up green. ☼ Red: LED flashes red.

[8] On older versions of the FX0-GENT, the STATUS LED is called MS LED.