GEFRAN

GFX4-ETHERNET

INSTALLATION AND OPERATION MANUAL

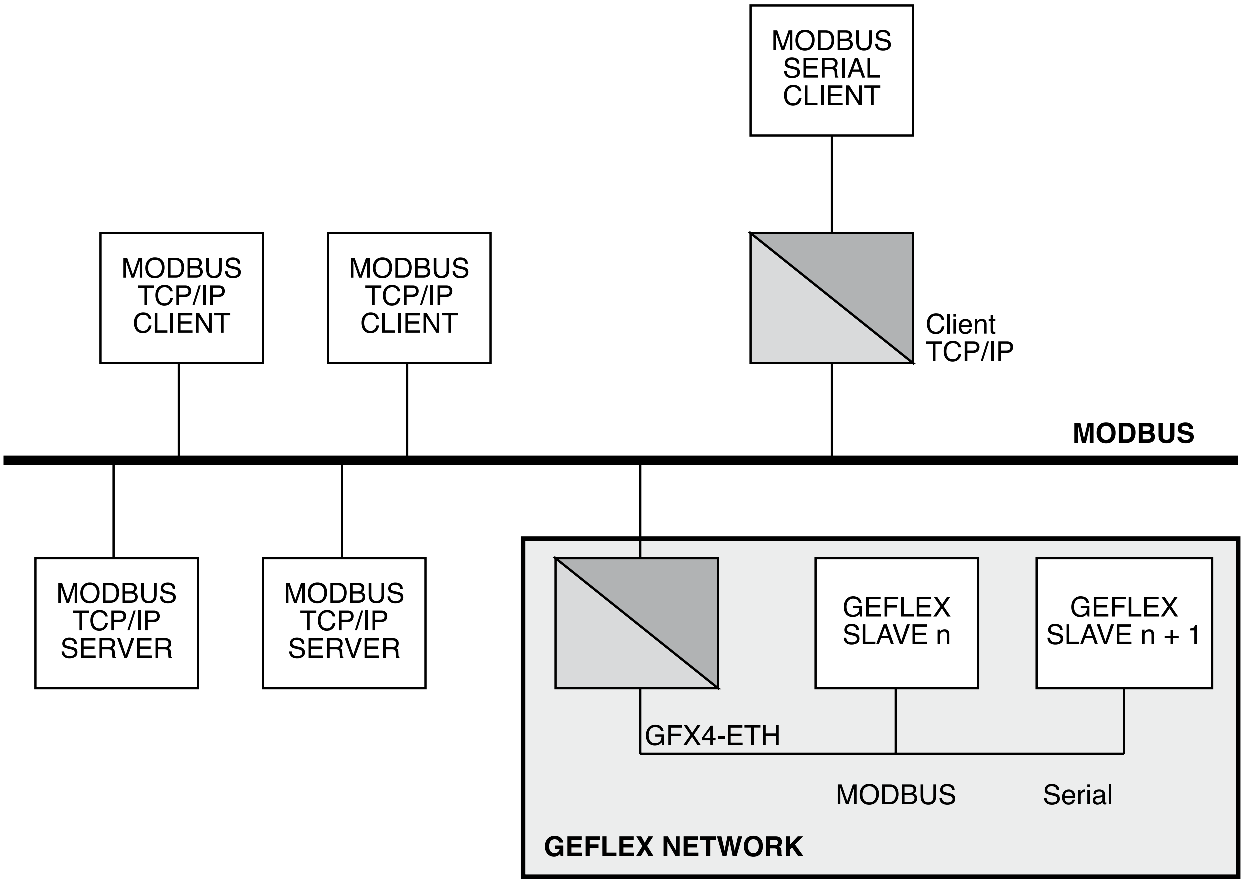
Software Version: **1.0x**

Code: **80403B** / Edition **02** - **01-2021 ENG**

INDEX

1 • Introduction

The GFX4-ETH module is IEEE 802.3 compliant supporting Ethernet operation for MODBUS TCP/IP communication architecture.



2 • Features

- IEEE 802.3 compliant
- Full-duplex and half-duplex modes
- Capable of supporting both 10 Mbps and 100 Mbps data rates
- Single RJ45 connection with leds indicator (yellow = link , green = activity)
- One socket available
- All MODBUS/TCP ADU are sent via TCP on registered port 502
- Default address: 192.168.1.100
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.1.1

3 • Dip-switch Function

On the GFX4-ETH card there are two Dip-switches for the following functions
Dip-switch 1 : reset of the default parameters
Dip-switch 2 : baud-rate selection

3.1 Resetting Parameters to Factory Defaults

At any moment, all of the GFX4-ETH board parameters can be restored to the factory default settings.
To do so:

1. Set Dip Switch S1 dip 1 = ON (located near RJ45 connector)
2. Restart GFX4-ETH board
3. Set Dip Switch S1 dip 1 = OFF

3.2 Selecting the Baud rate

Select the baud rate (10Mbit/s or 100Mbit/s) with Dip-switch 2.

1. Setting   Dip-switch 2 = ON for 10Mbit/s
Dip-switch 2 = OFF for 100 Mbit/s (default)

2. Reboot the board

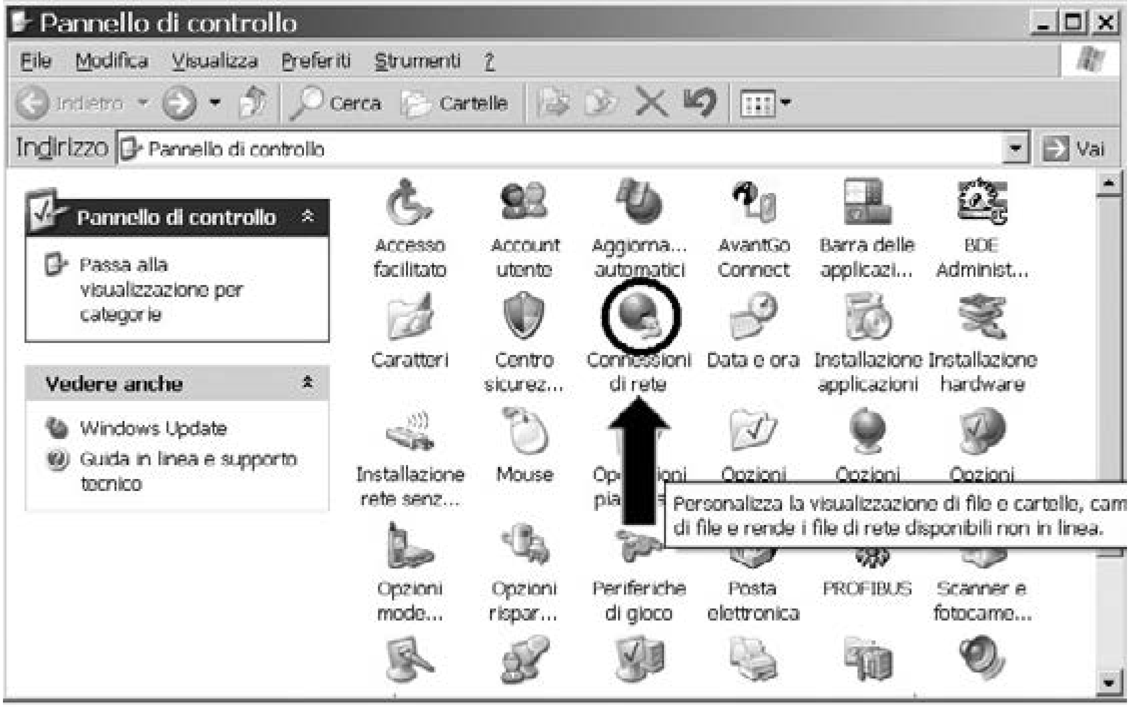
Note: if used on PC-compatible systems, it is advisable to supply the table of ARP addresses

Ex.: ARP-D control
In other systems (PLC) not equipped with this control, it is advisable to switch off and then on.

4 • Setup PC Connection

All the information in this quick guide require that the GFX4-ETH communicates with the host PC through a LAN connection.
In this pages you'll learn how to configure the PC to communicate with the GFX4-ETH using an Ethernet cross cable or hub/switch. The following steps are based on a Windows XP system.

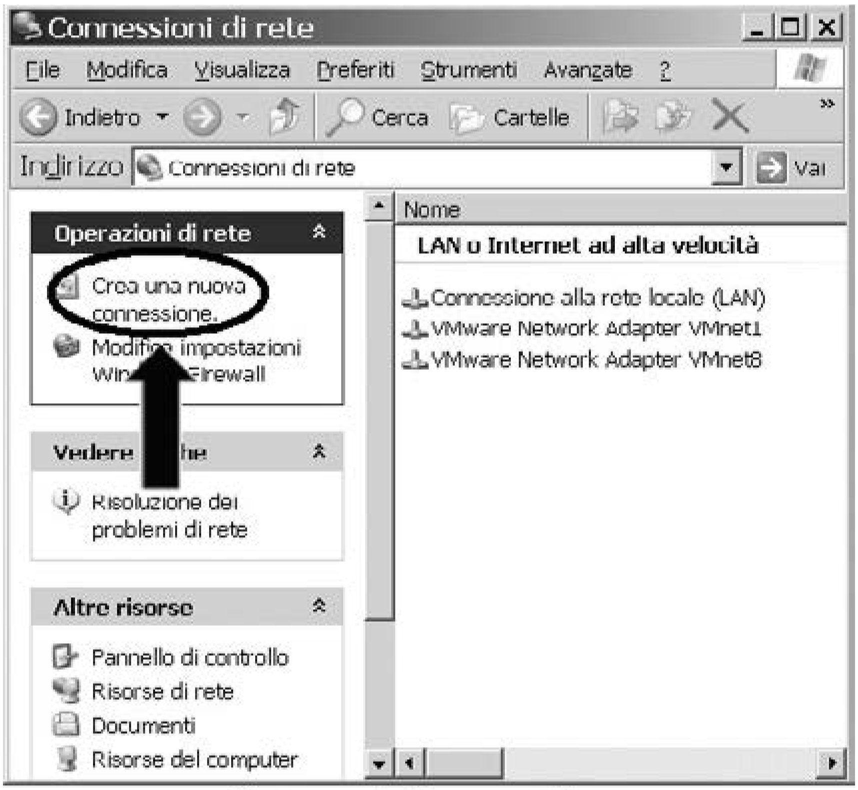
1. Open the Windows Control Panel and open the Network. Connections item:



Personalizza la visualizzazione di file e cartelle, cam
di file e rende i file di rete disponibili non in linea.

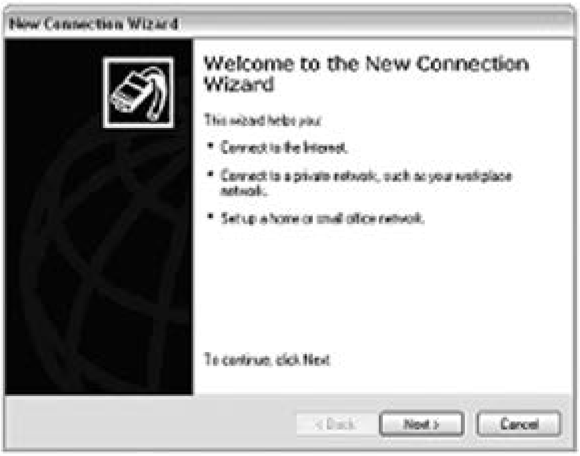
Windows Control Panel

2. If a Local Area Connection is already available, go to step 8.
Otherwise, run the "New Connection" wizard.


Connessioni di rete
File Modifica Visualizza Preferiti Strumenti Avanzate ?
Indietro Cerca Cartelle
Indirizzo Connessioni di rete Vai
Operazioni di rete
Crea una nuova connessione.
Modifica impostazioni Windows Firewall
Vedere anche
Risoluzione dei problemi di rete
Altre risorse
Pannello di controllo
Risorse di rete
Documenti
Risorse del computer
Nome
LAN o Internet ad alta velocità
Connessione alla rete locale (LAN)
VMware Network Adapter VMnet1
VMware Network Adapter VMnet8

Network Connections

3. The following dialog box will appear. Click Next.



Welcome to the New Connection Wizard

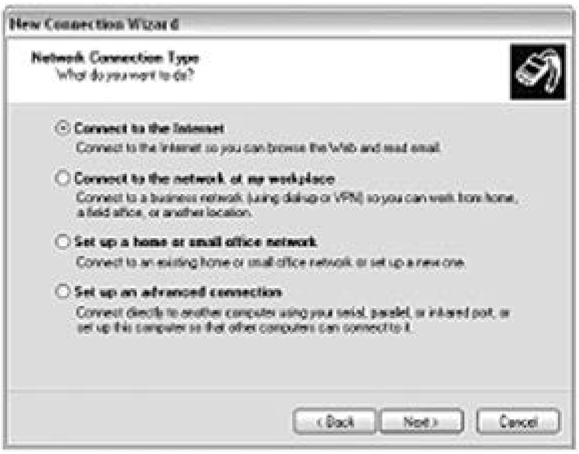
This wizard helps you:

- Connect to the Internet.
- Connect to a private network, such as your workplace network.
- Set up a home or small office network.

To continue, click Next.

New Connection Wizard, Step 1

4. On the next dialog box, select the “Connect to the Internet” option and click the “Next” button.



Network Connection Type
What do you want to do?

● Connect to the Internet
Connect to the Internet so you can browse the Web and read email.

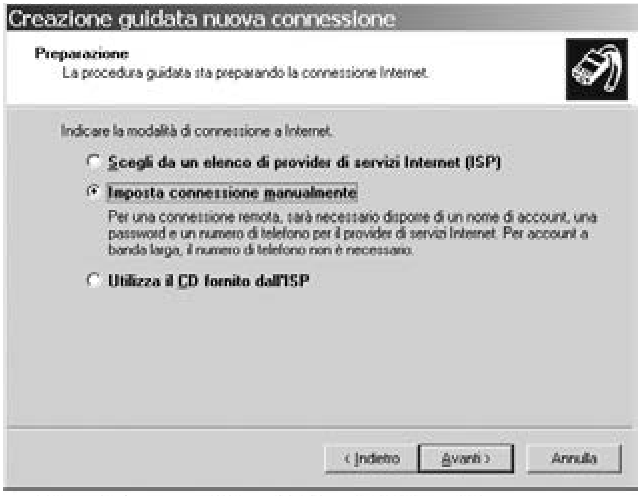
○ Connect to the network at my workplace
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.

○ Set up a home or small office network
Connect to an existing home or small office network or set up a new one.

○ Set up an advanced connection
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.

New Connection Wizard, Step 2

5. On the next dialog box, select the “Set up my connection manually option and click the “Next” button.



Preparazione
La procedura guidata sta preparando la connessione Internet.

Indicare la modalità di connessione a Internet.

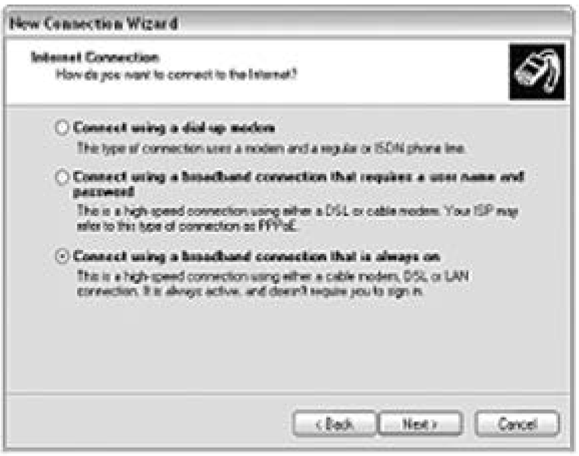
○ Scegli da un elenco di provider di servizi Internet (ISP)

● Imposta connessione manualmente
Per una connessione remota, sarà necessario disporre di un nome di account, una password e un numero di telefono per il provider di servizi Internet. Per account a banda larga, il numero di telefono non è necessario.

○ Utilizza il CD fornito dall'ISP

New Connection Wizard,Step 3

6. On the next dialog box, select the “Connect using a broadband connection that is always on” option and click the “Next” button.



New Connection Wizard

Internet Connection
How do you want to connect to the Internet?

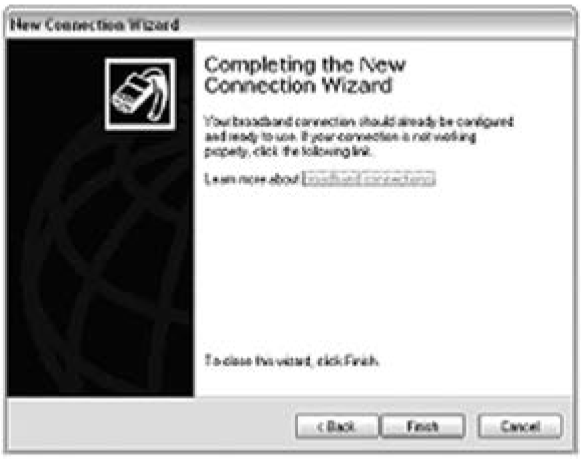
○ **Connect using a dial-up modem**
This type of connection uses a modem and a regular or ISDN phone line.

○ **Connect using a broadband connection that requires a user name and password**
This is a high-speed connection using either a DSL or cable modem. Your ISP may refer to this type of connection as PPPoE.

● **Connect using a broadband connection that is always on**
This is a high-speed connection using either a cable modem, DSL or LAN connection. It is always active, and doesn't require you to sign in.

New Connection Wizard. Step 4

7. When the last dialog box appears, click the “Finish” button.



New Connection Wizard

Completing the New Connection Wizard

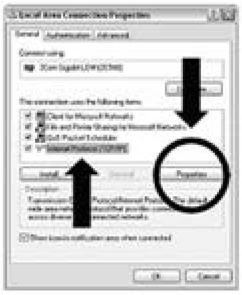
Your broadband connection should already be configured and ready to use. If your connection is not working properly, click the following link.

Learn more about broadband connections

To close this wizard, click Finish.

New Connection Wizard, Step 5

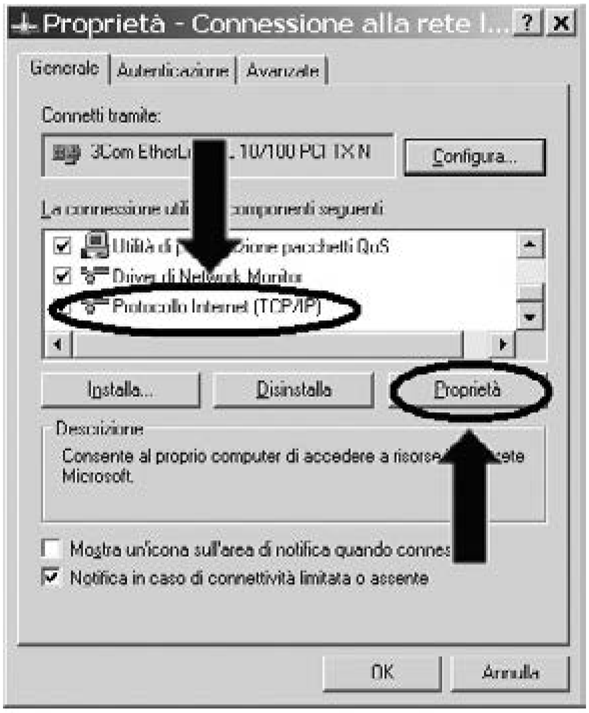
8. Open the newly created connection (or the existing connection if you are coming from step 2) and click the “Properties” button.



Local Area Connection Properties
General
Authentication
Advanced
Connect using:
This connection uses the following items:
Client for Microsoft Networks
File and Printer Sharing for Microsoft Networks
QoS Packet Scheduler
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Show icon in notification area when connected
OK
Cancel

Local Area Connection Status

9. Select the “Internet Protocol (TCP/IP)” item and click the “Properties” button.



Proprietà - Connessione alla rete l...

Connetti tramite:

3Com EtherL... 10/100 PCI TX N

La connessione uti... componenti seguenti

☑ Utilità di p... zione pacchetti QoS

☑ Driver di Network Monitor

Protocollo Internet (TCP/IP)

Descrizione

Consente al proprio computer di accedere a risorse ... rete Microsoft.

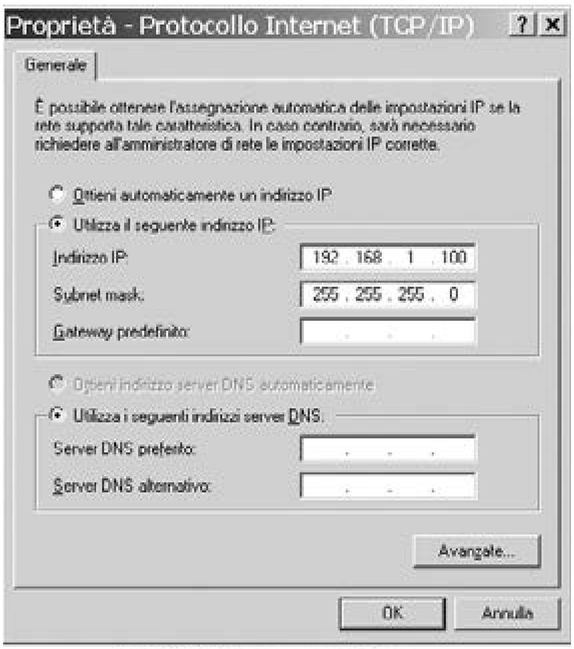
☐ Mostra un'icona sull'area di notifica quando connes...

☑ Notifica in caso di connettività limitata o assente

Local Area Connection Status

10. If you have started from an existing connection, write down all of the TCP/IP parameters. You’ll need them later to restore your LAN settings to the original parameters.

11. Select the manual settings and type in the following values:
IP address: 192.168.1.101
Subnet mask: 255.255.255.0



Proprietà - Protocollo Internet (TCP/IP)

È possibile ottenere l'assegnazione automatica delle impostazioni IP se la rete supporta tale caratteristica. In caso contrario, sarà necessario richiedere all'amministratore di rete le impostazioni IP corrette.

○ Ottieni automaticamente un indirizzo IP

● Utilizza il seguente indirizzo IP:

Indirizzo IP: 192 . 168 . 1 . 100

Subnet mask: 255 . 255 . 255 . 0

Gateway predefinito: . . .

○ Ottieni indirizzo server DNS automaticamente

● Utilizza i seguenti indirizzi server DNS:

Server DNS preferito: . . .

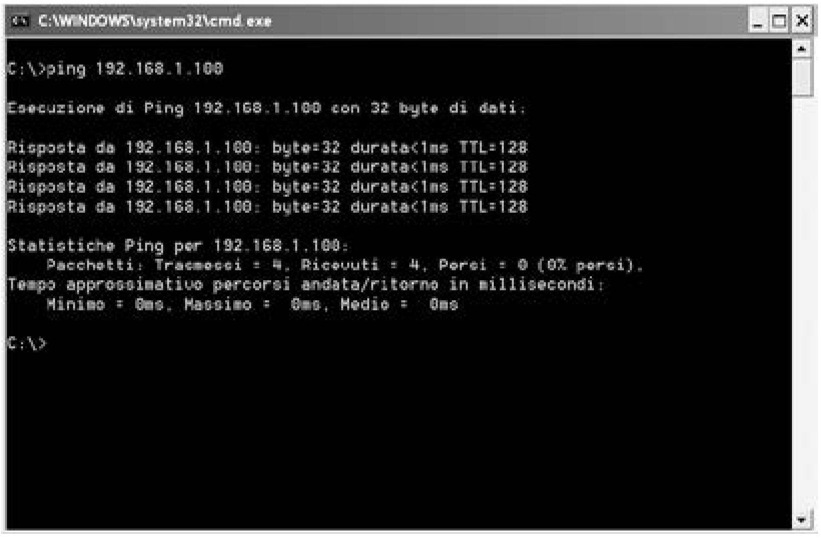
Server DNS alternativo: . . .

TCP/IP properties

Click the “OK” button on all LAN setup dialog boxes.

5 • Test Board Connection Using PING Command

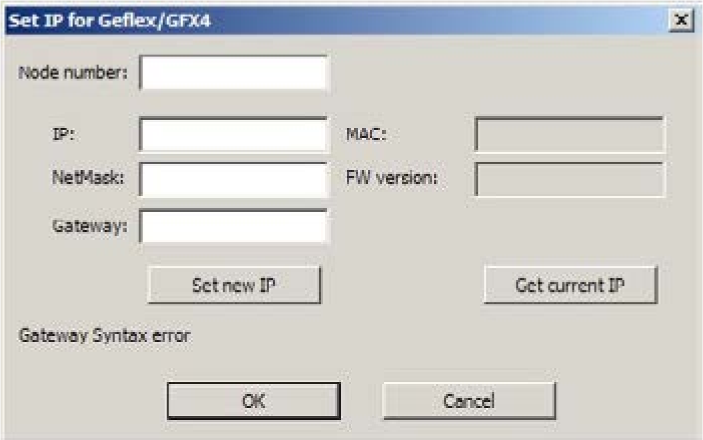
1. Power up the board and verify the POWER led turn on.
2. Connect the GFX4-ETH to the PC through an Ethernet cross cable or hub / switch.
3. Open a Command Prompt window (on Windows XP, from the Windows Start menu, select Run, enter CMD and click the “OK” button).
4. At the command prompt, type: PING 192.168.1.100
5. If the connection has been properly setup, the PING command will return a positive feedback.



```
C:\>ping 192.168.1.100

Esecuzione di Ping 192.168.1.100 con 32 byte di dati:

Risposta da 192.168.1.100: byte=32 durata<1ms TTL=128
Risposta da 192.168.1.100: byte=32 durata<1ms TTL=128
Risposta da 192.168.1.100: byte=32 durata<1ms TTL=128
Risposta da 192.168.1.100: byte=32 durata<1ms TTL=128

Statistiche Ping per 192.168.1.100:
    Pacchetti: Trasmessi = 4, Ricevuti = 4, Persi = 0 (0% persi),
Tempo approssimativo percorsi andata/ritorno in millisecondi:
    Minimo = 0ms, Massimo =  0ms, Medio =  0ms

C:\>
```

6 • Connect the Board to Your LAN

Before connecting the GFX4-ETH board to your LAN, the IP address must be changed to match the LAN settings. To change the GFX4-ETH’s IP address, do the following.



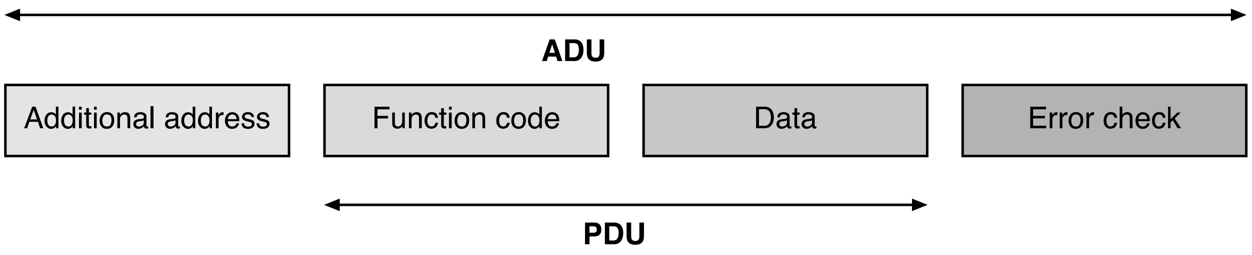
Gateway Syntax error

1. With the GFX4-ETH still connected to the PC via the Ethernet cross cable or hub /switch, launch the **SetIp_for_Geflex/GFX4** (see GF_eXpress documentation) utility that is located in the CD-ROM.
2. To set up the Node field number so that or in compliance with the real value of the rotary of card GFX4-ETH.
3. Press the **Get current IP** button. You can see actual IP address , subnet mask , default gateway and MAC adress.
4. Set your parameter and after click on **Set new IP** button.
5. Restart the GFX4-ETH board.
6. Goto to step 2 if you want to see new parameter.

7 • GFX4-ETH’s Modbus TCP/IP implemented command

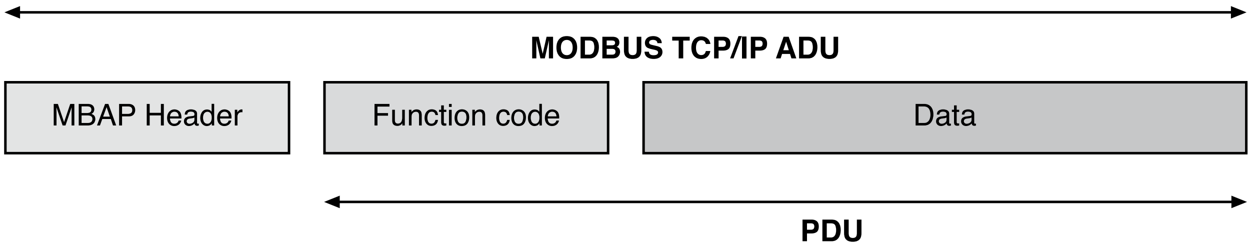
- 01 (0x01) Read Coils
- 02 (0x02) Read Discrete Inputs
- 03 (0x03) Read Holding Registers
- 04 (0x04) Read Input Registers
- 05 (0x05) Write Single Coil
- 06 (0x06) Write Single Register
- 15 (0x0F) Write Multiple Coils
- 16 (0x10) Write Multiple registers

The MODBUS protocol defines a simple Protocol Data Unit (PDU) independent of the underlying communication layers. The mapping of MODBUS protocol on specific buses or networks can introduce some additional fields on the Application Data Unit (ADU).



General Modbus Frame

The client that initiates a MODBUS transaction builds the MODBUS Application Data Unit.
The function code indicates to the server which kind of action to perform.



MODBUS request/response over TCP/IP

A dedicated header is used on TCP/IP to identify the MODBUS Application Data Unit. It is called the MBAP header (MODBUS Application Protocol header).

This header provides some differences compared to the MODBUS RTU application data unit used on serial line: the MODBUS 'slave address' field usually used on MODBUS Serial Line is replaced by a single byte 'Unit Identifier' within the MBAP Header.

The 'Unit Identifier' is used to communicate via devices such as bridges, routers and gateways that use a single IP address to support multiple independent MODBUS end units.

All MODBUS requests and responses are designed in such a way that the recipient can verify that a message is finished.

For function codes where the MODBUS PDU has a fixed length, the function code alone is sufficient.

For function codes carrying a variable amount of data in the request or response, the data field includes a byte count.

When MODBUS is carried over TCP, additional length information is carried in the MBAP header to allow the recipient to recognize message boundaries even if the message has been split into multiple packets for transmission.

The existence of explicit and implicit length rules, and use of a CRC-32 error check code (on Ethernet) results in an infinitesimal chance of undetected corruption to a request or response message.

The MBAP Header contains the following fields:

Fields	Length	Description	Client	Server
Transaction Identifier	2 Bytes	Identification of a MODBUS Request / Response transaction	Initialized by the client	Recopied by the server from the received request
Protocol Identifier	2 Bytes	0 = MODBUS protocol	Initialized by the client	Recopied by the server from the received request
Length	2 Bytes	Number of following bytes	Initialized by the client (request)	Initialized by the server (Response)
Unit Identifier	1 Byte	Identification of a remote slave connected on a serial line or on other buses	Initialized by the client	Recopied by the server from the received request

The header is 7 bytes long:

1. **Transaction Identifier** - It is used for transaction pairingthe MODBUS server copies in the response the transaction identifier of the request.
2. **Protocol Identifier** - It is used for intra-system multiplexing. The MODBUS protocol is identified by the value 0.
3. **Length** - The length field is a byte count of the following fields, including the Unit Identifier and data fields.
4. **Unit Identifier (Rotary switch value see Geflex Software Manual)** - This field is used for intra-system routing purpose. It is typically used to communicate to a MODBUS serial line slave through a gateway between an Ethernet TCP-IP network and a MODBUS serial line. This field is set by the MODBUS Client in the request and must be returned with the same value in the response by the server.

Serial communication time constraints in Modbus RTU

The following time constraints must be complied with in order to allow correct serial data exchange with the device:

Reading Word/Register parameters: Reading N consecutive parameters, with N from 1 to 16, requires a time of almost 50 ms. In this case the following read and write Modbus command, to the same node, must be sent after this interval time.

Writing Word/Register parameters: Writing N consecutive parameters, with N ranging from 1 to 16, if all values (maximum 16) on the device are updated, will take a time of:50ms + N x 80ms(*) with N from 1 to 16.

The times reported refer to the case in which the Baudrate of the serial line (parameter bAu Modbus address 45) is 19200.

(*) If STATUS_W parameters (Modbus address 305) are included in the write request and their value is different from the one currently present in the slave, the time required to write each one will be 240ms (instead of 80ms).