



INSTRUCTION MANUAL

DOCUMENT NO. 027 - 2151
Rev. 1.03 July 26, 2005

***SF - 10 Ethernet Module Kit
for the GP10 / VG10 and CV10
Inverter Series***



Saftronics, Inc.
5580 Enterprise Pkwy
Ft. Myers, FL 33905
Tel. (239) 693 - 7200
Fax (239) 639 - 2431
www.saftronics.com

SAFETY FIRST !

LETHAL VOLTAGES MAY BE PRESENT

PLEASE READ THIS MANUAL THOROUGHLY BEFORE ATTEMPTING ANY INSTALLATION, OPERATION, MAINTENANCE,OR INSPECTION. FAILURE TO FOLLOW THE RECOMMENDED PROCEDURES OR CAUTIONS IN THIS MANUAL COULD RESULT IN INJURY TO PERSONNEL AND / OR DAMAGE TO THE EQUIPMENT.

CAUTION

- 1 – CHECK THE NAME WRITTEN ON THE PRODUCT AND INSURE THAT THE PROPER PART HAS BEEN RECEIVED.
- 2 – THOROUGHLY INSPECT THE PART(S) FOR ANY DAMAGE DUE TO SHIPMENT OR HANDLING.
- 3 - THE PART(S) MAY CONTAIN CMOS CHIPS AND CAN BE DAMGED BY STATIC ELECTRICITY. HANDLING SHOULD BE IN ACCORDANCE WITH INDUSTRY STANDARDS.
- 4 - BEFORE INSTALLING THE PART(S) TURN OFF ALL POWER TO THE EQUIPMENT AND INSURE THE CHARGE INDICATOR LAMP ON THE INVERTER IS **OFF**. **LETHAL VOLTAGES ARE PRESENT**
- 5 - DO NOT CONNECT OR DISCONNECT WIRING WHILE POWER IS **ON !**
- 6 - FOLLOW GOOD STANDARD WIRING PRACTICES AND ANY APPLICABLE CODES THAT MAY APPLY.

CONTENTS

	<u>Page</u>
1. <u>Introduction</u>	3
1.1 <i>Some Features</i>	3
1.2 <i>Pictorial Layout</i>	3
<i>Fig. 1 System Pictorial</i>	3
1.3 <i>Kit Parts</i>	4
<i>Table 1 Kit Parts</i>	4
2. <u>Product Description and Specification</u>	4
2.1 <i>Specifications</i>	4
<i>Fig. 2 SF-10 Outline</i>	4
2.1.1 <i>Electrical</i>	4
2.1.2 <i>Environmental</i>	4
2.1.3 <i>LED Status Indicators</i>	5
<i>Table 2 SF-10 LED Indicator description</i>	5
3. <u>Network Parameters</u>	5
3.1 <i>Network Protocols</i>	5
3.2 <i>Packing Algorithms</i>	6
3.3 <i>Ethernet (MAC) Address</i>	6
3.4 <i>Internet Protocol Address</i>	6
3.5 <i>Port Number</i>	6
4. <u>Installation</u>	6-7
4.1 <i>Configuring the SF-10</i>	7
4.1.1 <i>Default IP Address</i>	7
4.1.2 <i>IP Address Configuration</i>	7
4.1.3 <i>Network Port Login</i>	7-8
<i>Fig. 3 DOS Screen</i>	8
4.1.4 <i>Serial Port Login</i>	9
<i>Fig. 4 Hyper Terminal Screen</i>	9
4.1.5 <i>Using a Web Browser</i>	9-10
<i>Fig. 5 Web Browser Login</i>	10
<i>Fig. 6 Web Browser Menu</i>	10
4.1.6 <i>Further Information</i>	10
4.2 <i>Network Connections</i>	11
4.3 <i>Saftronics Inverter(s) Connections</i>	11
<i>Fig. 7 Inverter Connections</i>	11
5. <u>Using the SF10 with MODBUS RTU for the GP10/VG10 and CV10 Inverters</u>	12
5.1 <i>General</i>	12
5.2 <i>Embedded MODBUS RTU</i>	12
5.3 <i>Sending and receiving data</i>	12
Appendices	
A <i>Further Networking Parameters and Information</i>	13
A.1 <i>General</i>	13
A.2 <i>More on IP</i>	13
A.2.1 <i>IP Addressing</i>	13-15
A.3 <i>Monitor Mode</i>	15-16
B <i>Networking Multiple Inverters</i>	17
B.1 <i>General</i>	17
<i>Fig. B1 GP10/VG10 & CV10 RS485 Serial Networking</i>	17

Introduction

The **Safronics' SF-10** Ethernet Module Kit provides an economical means of communicating with the **GP10, VG10** and **CV10** series of inverters over the Internet or Intranet. This Ethernet link using the IP protocol family (TCP for connection-oriented stream applications and UDP for datagram applications), will allow the remote accessing of drive data and parametric control. The kit includes the ethernet module, (RS485 adapter for the CV10 and cable. Through networking, multiple drives (up to 31,247 with repeater) may be accessed by one module, each having its' own unique address.

1.1 Some of the features

- Ease of accessing Safronics' inverter information over the Internet / Intranet
- Compatible with Windows 98, ME, NT4, 2000, and XP
- Allows the user to:
 - ❑ Edit all drive parameters
 - ❑ Upload and download drive parameters
 - ❑ Control the drive with built-in Digital Operator
 - ❑ Store and retrieve parameter files
 - ❑ Readout fault history
 - ❑ Automatically scan drive functions
 - ❑ Display diagnostics on LED readout

1.2 Pictorial layout

Fig.1 below is a pictorial layout of the **SF-10** implementation. The various part numbers are included which will be referenced in the kit parts Table 1 (sec. 1.3). Note that multiple inverters are shown for reference only and that the networking of multiple inverters require additional hardware not included in these kits.

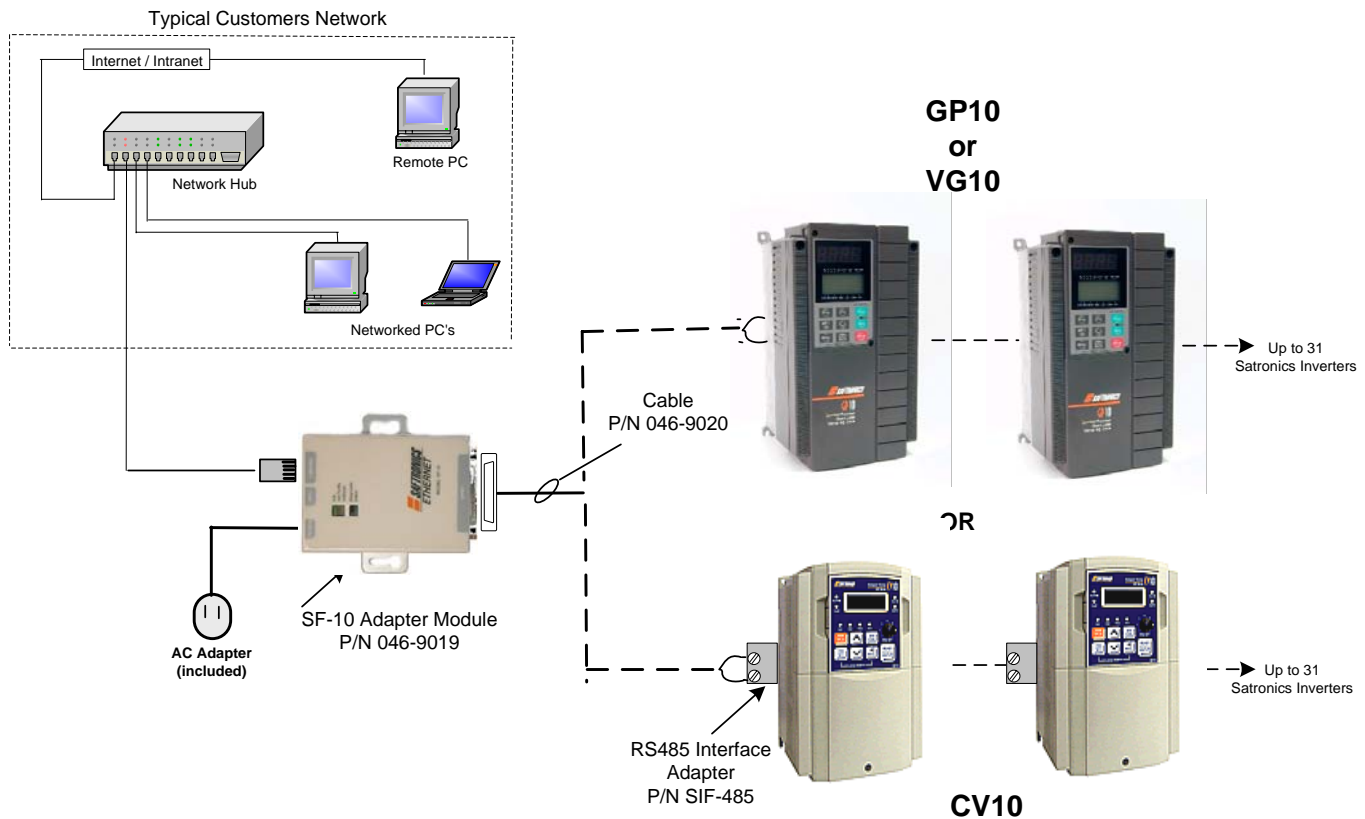


Fig. 1 System Pictorial

1.3 Kit Includes

Table 1 below shows the parts included in the kit for each of the inverter series.

Table 1 Kit Parts

INVERTER SERIES	KIT P/N	Kit Includes			
		MANUAL P/N	RS485 ADAPTER P/N	*SF-10 ADAPTER MODULE	SERIAL CABLE P/N
GP10	046 - 7034	027-2151	N/A	046 - 9019	046 - 9020
VG10	046 - 7035	027-2151	N/A	046 - 9019	046 - 9020
CV10	046 - 7029	027-2151	SIF-485	046 - 9019	046 - 9020

* Includes AC Power Supply Adapter

2. Product Description and Specifications

Fig. 2 below, shows the basic dimensional outline of the **SF-10** Ethernet Module as well as the location of the main features. The unit housing is metal with mounting ears, and has composition mounting pads.

2.1 Specifications

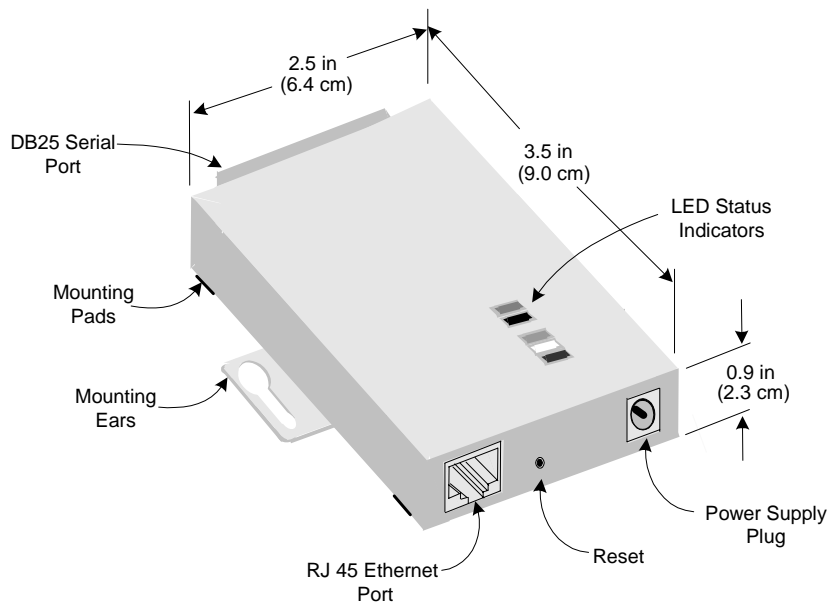


Fig. 1 SF-10 Outline

2.1.1 Electrical

Power Input	9-30 VDC (3 W max.) Provided by external 120 VAC adapter (included)
Network Interface	10Base-T (RJ45 connector) (customer supplied cable)
CPU, Memory Controllers	AMD 188E CPU (25MHz), Realtek Ethernet Controller, 128kByte RAM, 512kByte Flash PROM

2.1.2 Environmental

Temperature	Operating Range: 5° to 50° C (41° to 122° F) Storage Range: -40° to 66° C (-40° to 151° F) Maximum temperature change per hour: 20° C (36° F)
Altitude	Operating: 8,000 ft (2.4 km) maximum Storage: 30,000 ft (9.1 km) maximum
Relative Humidity	Operating: 10 to 90% non-condensing, 40 to 60% recommended Storage: 10 to 90% non-condensing

2.1.3 LED Status Indicators

Five LED's are located on top of the **SF-10** module. Table 2 below explains their functions.

Table 2 SF-10 LED Indicators

LED	COLOR	DESCRIPTION
Link	Green	Lights solid green to indicate network port is connected to the network
Net Tx / Rx	Yellow	Blinks yellow to indicate network packets are transmitting and receiving
Collision	Red	Lights solid red to indicate network collisions
Diagnostic	Red	<p>Blinks or glows red in combination with the green Status LED to indicate diagnostics and error detection. (This code should only appear after power up. Even though the Device Server is going into operation mode, the problem will potentially persist)</p> <p>Red solid, green (Status LED) blinking: 1x : EPROM checksum error 2x : RAM error 3x : Network controller error 4x : EEPROM checksum error 5x : Duplicated IP address on the network</p> <p>Red blinking, green (Status LED) blinking: 4x : Faulty network connection 5x : No DHCP response received</p>
Status	Green	<p>Lights solid green to indicate serial port is connected to the network and idle.</p> <p>Blinks green to indicate serial port is connected to the network and active.</p>

2.1.4 Product Information Label

A product information label is located on the underside of the **SF-10**, and contains the following specific information.

- Bar code
- Serial number
- Product ID (name)
- Product description
- Ethernet address (also referred to as Hardware Address or MAC Address)

3. Network Parameters

The basic network parameters are covered in the following section. More detailed information is covered in **Appendix A**.

3.1 Network Protocols

The **SF-10** uses IP protocol for network communications. The supported protocols are ARP, UDP, TCP, ICMP, Telnet, TFTP, DHCP, HTTP, and SNMP. For connections to the serial port, TCP, UDP or Telnet protocols are used. Firmware updates can be performed using TFTP.

The Internet Protocol (IP) defines addressing, routing, and data block handling over the network. The Transmission Control Protocol (TCP) assures that no data is lost or duplicated, and that everything sent to the connection arrives correctly at the target.

For typical datagram applications in which devices interact with other devices without maintaining a point-to-point connection, User Datagram Protocol (UDP) is used.

3.2 Packing Algorithms

Two firmware selectable packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the **SF-10** is used in a local environment, allowing for very small delays for single characters while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network, and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.

3.3 Ethernet (MAC) Address

The Ethernet address is also referred to as the hardware address or the MAC address. The first three bytes of the Ethernet Address are fixed, and read 00-20-4A. The fourth, fifth, and sixth bytes are unique numbers assigned to each **SF-10**.

Sample Ethernet Address

00-20-4A-14-01-18 or 00:20:4A:14:01:18

3.4 Internet Protocol (IP) Address

Every device connected to an IP network must have a unique IP (Internet Protocol) address. This address is used to reference the specific **SF-10**. An IP address is a 32 - bit value divided into four octets of 8 bits each. The standard representation is four decimal numbers (0-255) divided by dots (decimal dot notation).

Sample IP Address

192.2.12.123 or (192.002.012.123)

3.5 Port Number

Every TCP connection, and every UDP datagram, is defined by a destination IP address and a port number. For example, a Telnet application commonly uses port number 23. A port number is similar to an extension on a PBX system.

The **SF-10's** serial channel (port) can be associated with a specific TCP/UDP port number. Port number **9999** is reserved for access to the **SF-10's** setup (configuration) menu.

4. Installation

Please read this manual in its' entirety before attempting any installation !

The following sections will show the necessary steps required to get the **SF-10** module on line, and communicating with Safronics drive(s). The steps to be followed are:

- 1 – Configure the **SF-10** with a valid IP address and configure the serial port.
- 2 – Make the necessary network connections.
- 3 – Make the necessary serial connections to the drive(s) to be accessed.
- 4 - Test system.

CAUTION ! In working with the Safronics inverters, exercise extreme care, as there are lethal voltages present. Be sure to follow the instructions that come with the inverters to ensure the safety of all personnel and that no damage will occur to the equipment.

4.1 Configuring the SF-10

This section covers the required steps to get the **SF-10** on-line and working. There are two basic methods used to log into the **SF-10** and access the set up menu:

- Network Port Login: Make a Telnet connection to the network port (port 9999).
- Serial Port Login: Connect a terminal or a PC running a terminal emulation program directly to the **SF-10's** serial port.

It is important to consider the following points before logging into and configuring the **SF-10**:

- The **SF-10's** IP address must be configured before a network connection is available.
- Only one person at a time may be logged into the configuration port (port 9999). This eliminates the possibility of several people simultaneously attempting to configure the **SF-10**.
- Network port logins cannot be disabled. The system manager will always be able to access the unit. However, this port can be password protected.
- Only one terminal at a time can be connected to the serial port. (In RS-485 mode, the **SF-10** is capable of multidrop connections.)

4.1.1 Default IP Address

The **SF-10** ships with a default IP address of 0.0.0.0, which automatically enables DHCP within the **SF-10**.

Provided a DHCP server exists on the network, it will supply the **SF-10** with an IP address, gateway address, and subnet mask when the **SF-10** boots up. (If no DHCP server exists, the **SF-10** will respond with a diagnostic error: the red Diagnostic LED blinks continuously and the green Status LED blinks five times.) This address will *not* appear in the **SF-10's** configuration screens; however, if you enter Monitor Mode from the serial port with network connection enabled (see Monitor Mode, Appendix A, A.3), and issue the **NC** command, you will see the **SF-10's** IP configuration.

4.1.2 IP Address Configuration

The **SF-10's** IP address must be configured before a network connection is available. If the IP address was not set automatically via DHCP, set it now using a network or serial port login and the setup (configuration) menu.

4.1.3 Network Port Login

Using the ARP method, which is available under UNIX and Windows-based systems proceed as follows. (*Note:* If the **SF-10** has no IP address, it will set its address from the first directed TCP/IP packet it receives.)

- 1 – Power up the **SF-10** and make the network connection to the RJ45 Ethernet Port. (see Fig. 2)
- 2 - On a **UNIX** host, create an entry in the host's ARP table using the intended IP address and the hardware address (MAC) of the **SF-10**, which is found on the product label on the bottom.

ARP on UNIX

```
arp -s 191.12.3.77 00:20:4a:xx:xx:xx
```

In order for the ARP command to work on **Windows**, the ARP table on the PC must have at least one IP address defined other than its own. If the ARP table is empty, the command will return an error message. Type `ARP -A` at the DOS command prompt to verify that there is at least one entry in the ARP table.

If the local machine is the only entry, ping another IP address on your network to build a new entry in the ARP table; the IP address must be a host other than the machine on which you are working. Once there is at least one additional entry in the ARP table, use the following command to ARP an IP address to the **SF-10**:

ARP on Windows

```
C:\> arp -s 191.12.3.77 00-20-4a-xx-xx-xx
```

- 3 - Now open a Telnet connection to port 1. The connection will fail quickly, but the **SF-10** will temporarily change its IP address to the one designated in this step.

Telnet to Port 1

```
C:\> telnet 191.12.3.77 1
```

- 4 - Finally, open a Telnet connection to port 9999

Telnet to Port 9999

```
C:\> telnet 191.12.3.77 9999
```

Note: The IP address used above is temporary and will revert to the default value when the **SF-10's** power is reset. The IP address that is programmed in the **SF-10** in the initial setup and stored will be permanent.

- 5 – Press **enter** and the setup screen will appear as shown in Fig. 3. Complete the following steps.

- In **Change Setup**, enter **(0) Server Configuration** and then enter the **IP** address (xxx.xxx.xxx.xxx).
- Push **enter** until you get back to **Change Setup** and enter **(1) Channel 1 Configuration**.

Set: Baudrate <2400> 9600

I/F Mode <4C> 4D (RS422 / 485 4 wire)

- Push **enter** until you get back to **Change Setup** and enter, **(9) Save and Exit**.

```

DOS - telnet 192.168.3.253 9999
Serial Number 2447205  MAC address 00:20:4A:24:B8:65
Software version 04.4 (010322)
Press Enter to go into Setup Mode

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.3.253, no gateway set

***** Security *****
Telnet setup is      enabled
TFTP download is    enabled
Port 77FEh is       enabled
Web Server is       enabled
Enhanced password is disabled

***** Channel 1 *****
Baudrate 2400, I/F Mode 4D, Flow 00
Port 10001
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0  Disconn Mode: 00
Flush Mode : 00

Change Setup : 0 Server configuration
               1 Channel 1 configuration
               6 Security
               7 Factory defaults
               8 Exit without save
               9 Save and exit
               Your choice ?
  
```

Fig. 3 Dos Screen

4.1.4 Serial Port Login

- 1 - Connect a console terminal or PC running a terminal emulation program such as **Hyper Terminal** to the **SF-10's** serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit.
- 2 - To enter Setup (configuration) Mode, cycle the **SF-10's** power (power off and back on). After power-up the self-test begins and the red Diagnostic LED starts blinking. You have one second to enter three lowercase "x" characters. The Setup screen should appear as shown in Fig. 4.

Note: *The easiest way to enter Setup Mode is to hold down the "x" key at the terminal (or emulation) while powering up the SF-10.*

- 3 - Proceed to set the IP address and serial port parameters as previously described in Section.4.4.1, 5, a.,b., & c.

```

*
Serial Number 2447205  MAC address 00:20:4A:24:B8:65
Software version 04.4 (010322)
Press Enter to go into Setup Mode

*** basic parameters
Hardware: Ethernet Autodetect
IP addr 192.168.3.253, no gateway set

***** Security *****
Telnet setup is   enabled
TFTP download is enabled
Port 77FEh is    enabled
Web Server is    enabled
Enhanced password is disabled

***** Channel 1 *****
Baudrate 2400, I/F Mode 4D, Flow 00
Port 10001
Remote IP Adr: --- none ---, Port 00000
Connect Mode : C0   Disconn Mode: 00
Flush  Mode : 00

Change Setup : 0 Server configuration
               1 Channel 1 configuration
               6 Security
               7 Factory defaults
               8 Exit without save
               9 Save and exit

Your choice ? _

```

Fig.4 Hyper Terminal Screen

4.1.5 Using a Web Browser

After the **SF-10** has an established IP address, you can log into it using a standard Web browser with Java enabled. To do this proceed as follows.

- 1 – Type the **SF-10's** IP address into the Web browser's URL (Address/Location) field. Once you have connected to the **SF-10**, you will see the Web manager interface. See Fig. 5.

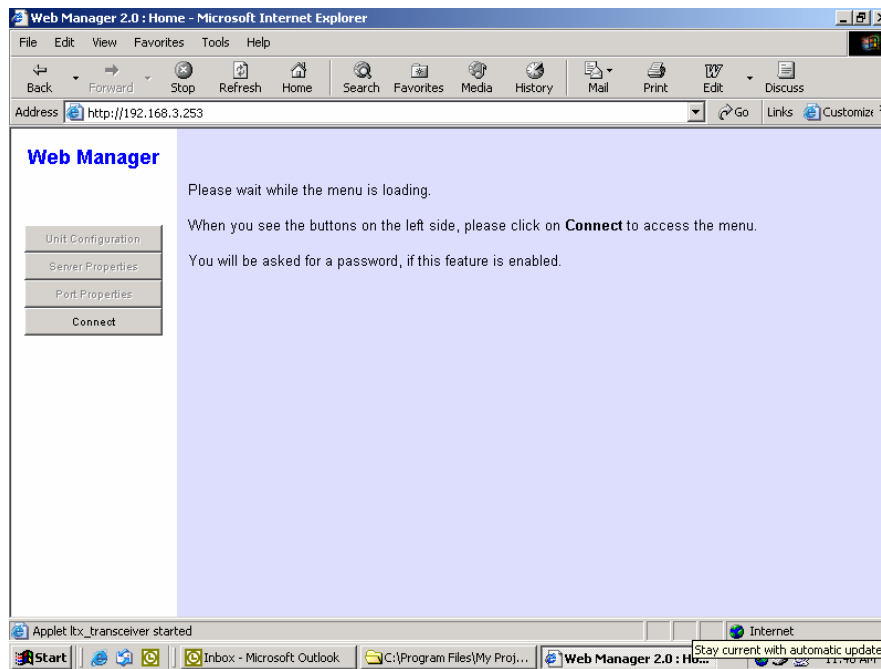


Fig. 5 Web Browser Login

2 – Select **Connect** to gain access to the navigation menu, Fig. 6, where you can edit the accessible parameters.

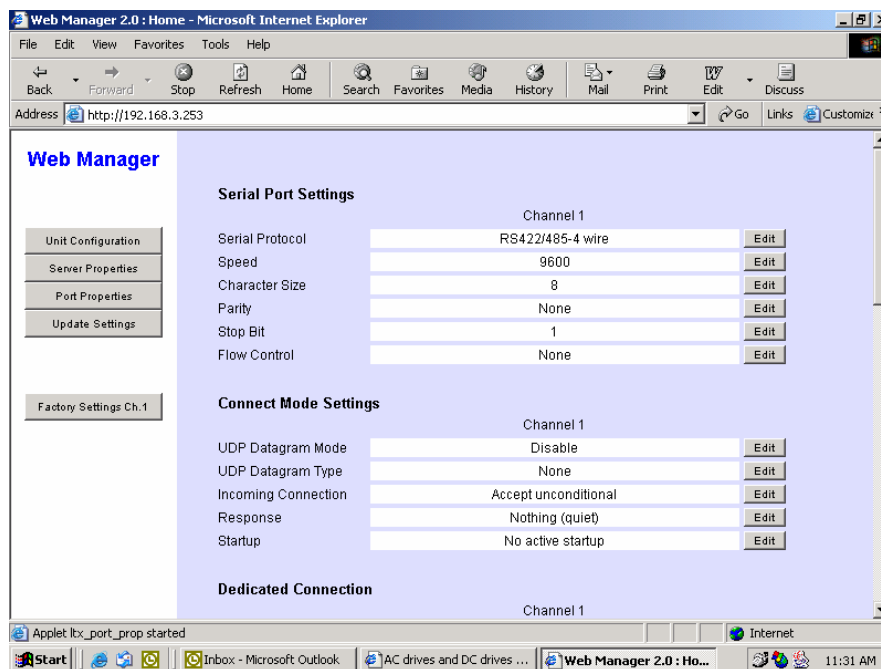


Fig. 6 Web Browser Menu

4.1.6 Further Information

The forgoing information and procedures are the minimum basics to getting the **SF-10** up and running. There may be additional configuration parameters that need to be set depending upon the network requirements. It is best left to the network administrator to determine these parameters. For further evaluation, additional information pertaining to the **SF-10**, is covered in **Appendix A**.

4.2 Network connections

After the SF-10 has been configured, it may be mounted and connected to the network. The physical network connection of the **SF-10** is made through the RJ45 (10Base-T) Ethernet port that supports up to 10 Mbps. The Physical location of the **SF-10** should be such that it is close enough to the **Safronics'** inverter to access the serial port. The network connecting cable is to be provided by the user.

- 1 – Mount the **SF-10** accordingly and insure that the environmental specifications (Section. 2.1.2) are observed.
- 2 – Make the network connection and power up the **SF-10**.

4.3 Safronics Inverter Connections

The connection to the Safronics' inverter(s) is made through the serial port of the **SF-10**. The cable to make the connection is provided with the kit. The cable has a DB25 connector on one end and (2) wire leads on the other for terminal connections. An RS485 adapter (P/N SIF-485) is supplied for the **CV10**. The cables are approximately 7 feet in length but longer cables may be used as the port configuration is RS485. As mentioned previously, **Power down the inverter before attempting to make any connections as lethal voltages are present! Refer to the specific inverter manual in preparation for making the connections.**

- 1 – Power down the inverter and make the connections to the serial port as shown in Fig. 7

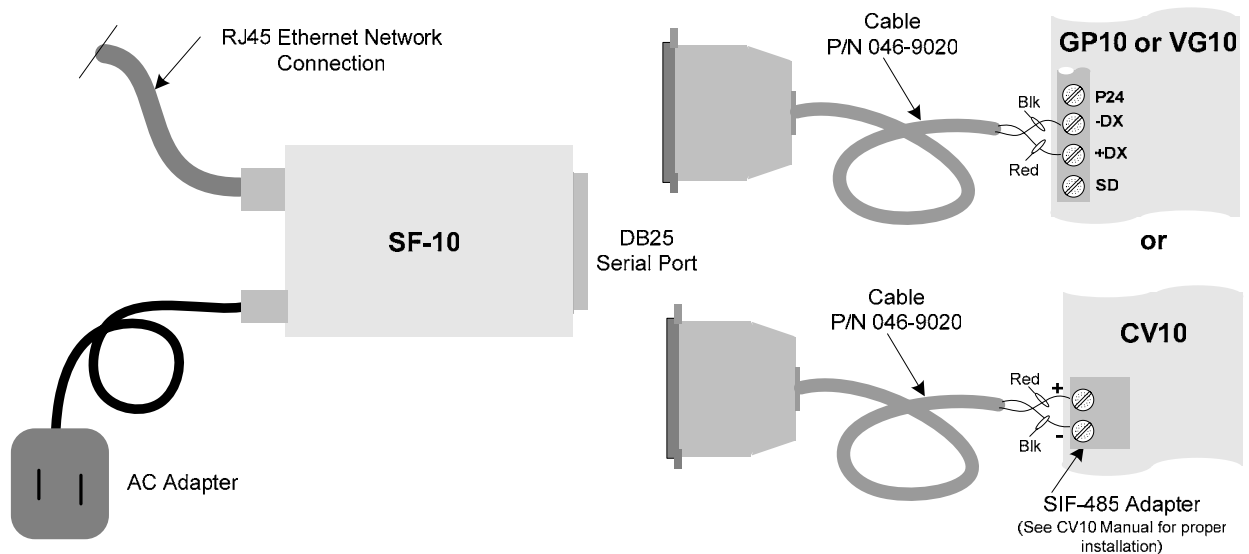


Fig. 7 Inverter Connections

- 2 – After the connections are made, replace cover(s) and secure any other equipment.

Note: Multiple inverters (up to 31, 247 with repeater) may be networked together and connected to one SF-10. Each inverter will have its' own unique address.

5. Using the SF-10 with MODBUS RTU for the GP10/VG10 and CV10 Inverters

5.1 General

The **SF-10** Adapter Module can be used as a standalone gateway using the TCP/IP Protocol. To do this the **SF-10** needs to be programmed with a valid IP address and the serial port parameters set. Chapter 4, Installation provides the necessary steps to set the required parameters.

The following items are required to interface with the **SF-10**:

- Ethernet Connection
- Master Device that communicates TCP/IP Protocol

5.2 Embedded MODBUS RTU

The **Saftronics** drive series **GP10**, **VG10** and **CV10** connects to the **SF-10** via the standard RS485 **MODBUS** port. In order to communicate with a drive it is necessary to incorporate full **MODBUS** commands into the data sent to the **SF-10** module. The **GP10** (P/N 027-GP1001) and **VG10** (P/N 027-VG. 1001) Instruction Manuals and the **CV10** MODBUS Protocol Manual (P/N 027-2178) will provide the necessary information about the **MODBUS** protocol and **MODBUS** registers.

5.3 Sending and Receiving Data

There are several devices that can be used on the Ethernet to custom send data out to an IP address using the TCP/IP protocol.

- PC using custom program with a TCP/IP Active X incorporated to send and receive data over the Ethernet.
- PLC Module that communicates over Ethernet using the TCP/IP protocol and allows you to send and receive custom data packets.

The TCP/IP protocol consists of a stream of data packets that are send one after another. TCP/IP ensures that packets make it to their final destination correctly. Once received by the **SF-10** module the packets are reassembled into the original data stream.

The **SF-10** extracts the **MODBUS** data from the data stream and sends it to the serial port. When the drive sends back a response the **SF-10** module will incorporate the return data into a TCP/IP data package and send it out over the network

As described in Appendix B, multiple drives (up to 31, 247 with repeater) may be accessed through one **SF-10** module.

Appendix A : Further Network Parameters and Information

A.1 General

The prior network information covered is the basics to get the **SF-10** up and running, and is sufficient in most cases. However, the following will cover more detail to enable further evaluation and settings of network parameters. There may be additional information required that is beyond the scope of this manual and will be left to the resources of the user.

A.2 More on IP

A.2.1 IP Addressing

Every device connected to a TCP/IP network must have a unique IP (Internet Protocol) address. This address is used to reference the specific device; for example, to build a connection to the **SF-10's** serial port.

An IP address is a 32-bit value divided into four octets of eight bits each. The standard representation is four decimal numbers (0-255) divided by dots (decimal dot notation).

Sample IP Address

192.2.12.123 (or 192.002.012.123)

The IP address is divided into two parts: network and host. To support different needs, three network classes have been defined. In the following, "x" stands for the host part of the IP address.

Class A Network

IP address 1.x.x.x to 127.x.x.x

The first byte defines the host, and the last three bytes define the network. Only 127 different Class A networks exist, and each can consist of up to 16,777,216 devices.

Class A Network IP Address

10.0.0.1 (network 10, host 0.0.1)

Class B Network

IP address 128.0.x.x to 191.255.x.x

The first two bytes define the host, and the last two bytes define the network. Class B networks are typically used for large company networks, and each can consist of up to 65,534 devices.

Sample Class B Network IP Address

172.1.3.2 (network 172.1, host 3.2)

Class C Network

IP address 192.0.0.x to 223.255.255.x

The first three bytes define the host, and the last byte defines the network. Class C networks are the most common and are often used in smaller companies. Each network can consist of up to 254 hosts.

Sample Class C Network IP Address

192.7.1.9 (network 192.7.1, host 9)

Class D Network

IP address 224.x.x.x to 239.x.x.x

These addresses are used as multicast addresses.

Class E Network

IP address 239.x.x.x to 254.x.x.x

These addresses are reserved.

Network Address

A host address with all host bits set to **0** addresses the network as a whole (for example, in routing entries).

Sample Network Address

192.168.0.0

Broadcast Address

A host address with all host bits set to **1** is the broadcast address, meaning for "for every station."

Sample Broadcast Address

192.168.0.255

Network and broadcast addresses must not be used as a host address; for example, 192.168.0.0 identifies the entire network, and 192.168.0.255 identifies the broadcast address.

Gateway Address

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the **SF-10**.

Note: *The gateway address must be within the local network.*

IP Netmask

A netmask divides IP address differently than the standards defined by the classes A, B, and C. A netmask defines the number of bits to be taken from the IP address as the network or host sections. The **SF-10** prompts for the number of host bits to be entered and then calculates the netmask, which is displayed in standard decimal-dot notation (for example, 255.255.255.0) when saved parameters are displayed.

Standard IP Network Netmasks			
Network Class	Network Bits	Host Bits	Netmask
A	8	24	255.0.0.0
B	16	16	255.255.0.0
C	24	8	255.255.255.0

Netmask Examples	
Netmask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
...	...
255.128.0.0	23
255.0.0.0	24

Private IP Networks and the Internet

If your network is not and will not be connected to the Internet, you may use any IP address. If your network is connected or will be connected to the Internet, or if you intend to operate the **SF-10** on an intranet, you should

use one of the reserved sub-networks. Consult your network administrator with questions about IP address assignment.

Network RFCs

For more information about IP addresses, refer to the following documents, which can be located on the World Wide Web using one of the following directories or indices:

- RFC 950 Internet Standard Subnetting Procedure
- RFC 1700 Assigned Numbers
- RFC 1117 Internet Numbers
- RFC 1597 Address Allocation for Private Networks

A.3 Monitor Mode

Monitor Mode is a command-line interface used for diagnostic purposes (see Table Monitor Mode Commands). There are two ways to enter Monitor Mode: locally via the serial port or remotely via the network.

Via the Serial Port

To enter Monitor Mode locally:

- 1 - Follow the same principals used in setting the serial configuration parameters (see Serial Port Login on page 9 Sec.4.1.4).

Instead of typing three "x" keys, however, type **xx1** to enter Monitor Mode with network connections.

Type **xx2** or **yyy** to enter Monitor Mode **without** network connections.

- 2 - A **O>** prompt indicates that you have successfully entered Monitor Mode.

Via the Network

To enter Monitor Mode using a Telnet connection:

- 1 - First establish a Telnet session. The following message appears:

Entering Monitor Mode via the Network

```
*** Universal Device Server ***
Serial Number 1400280 MAC address 00:20:4A:14:01:18
Software Version 04.0b7 (000428)
Press Enter to go into Setup Mode
```

- 2 - Type **M** (upper case).
- 3 - A **O>** prompt indicates that you have successfully entered Monitor Mode.

Monitor Mode Commands

The following table shows the commands that are available in Monitor Mode. Many commands have an IP address as an optional parameter (x.x.x.x). If the IP address is given, the command is applied to another Device Server with that IP address. If no IP address is given, the command is executed locally.

Note: All commands must be given in capital letters, with blank spaces between the parameters.

Monitor Mode Commands		
Command	Command Name	Function
DL	Download	Download firmware to the SF-10
SF x.x.x.x	Send Firmware	Send firmware to Device Server with IP address x.x.x.x
VS x.x.x.x	Version	Query software header record (16-byte) of Device Server with IP address x.x.x.x
GC x.x.x.x	Get Configuration	Get configuration of Device Server with IP address x.x.x.x as hex records
SC x.x.x.x	Send Configuration	Set configuration of Device Server with IP address x.x.x.x from hex records
PI x.x.x.x	Ping	Ping Device Server with IP address x.x.x.x to check device status
AT	ARP Table	Show the SF-10's ARP table entries
TT	TCP Connection Table	Shows all incoming and outgoing TCP connections (used only with monitor mode)
NC	Network Connection	Shows the SF-10's IP configuration
RS	Reset	Resets the SF-10's power
SI x.x.x.x:n.n.n.n	Send/Set IP Address	Remotely assign an IP address to a Device Server, where x.x.x.x is the new IP address and n.n.n.n is the remote Device Server's serial number written twice
QU	Quit	Exit diagnostics mode

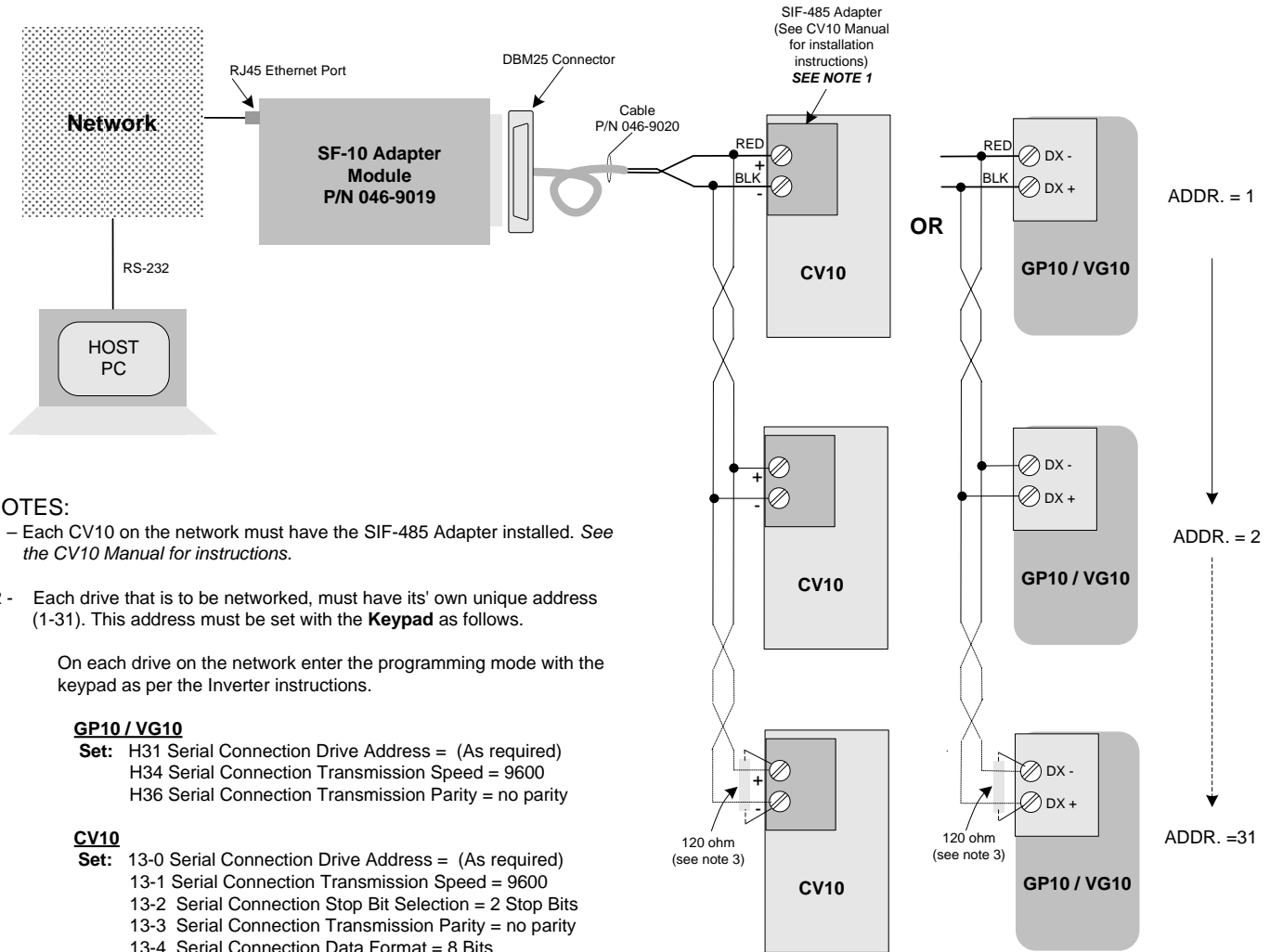
Entering any of the commands listed above will generate one of the following command response codes:

Command Response Codes	
Response	Meaning
0>	OK; no error
1>	No answer from remote device
2>	Cannot reach remote device or no answer
8>	Wrong parameter(s)
9>	Invalid command

Appendix B : Networking multiple drives.

B.1 General

Up to 31 drives (247 with a repeater) may be locally networked together using a RS485 bus structure as shown in Fig. B1. Each drive on the local network must have its' own unique address. This address must be programmed into the drive with the keypad. Please refer to the individual drive manual for further addressing information. When the addressing is completed, that drive may accessed by entering the specific address.



NOTES:

- 1 - Each CV10 on the network must have the SIF-485 Adapter installed. See the CV10 Manual for instructions.
- 2 - Each drive that is to be networked, must have its' own unique address (1-31). This address must be set with the **Keypad** as follows.

On each drive on the network enter the programming mode with the keypad as per the Inverter instructions.

GP10 / VG10

Set: H31 Serial Connection Drive Address = (As required)
 H34 Serial Connection Transmission Speed = 9600
 H36 Serial Connection Transmission Parity = no parity

CV10

Set: 13-0 Serial Connection Drive Address = (As required)
 13-1 Serial Connection Transmission Speed = 9600
 13-2 Serial Connection Stop Bit Selection = 2 Stop Bits
 13-3 Serial Connection Transmission Parity = no parity
 13-4 Serial Connection Data Format = 8 Bits

* Most of the software settings are initially set by default but should be checked for conformance.

- 3 - The RS-485 comm. line on the **last** Inverter must be terminated with a 120 ohm 1/2 w resistor. This resistor is provided with the Inverter.

Fig. B1 GP10 / VG10 & CV10 RS - 485 SERIAL NETWORKING

WARNING!

Saftronics manufactures component parts that can be used in a wide variety of industrial applications. The selection and application of *Saftronics* products remains the responsibility of the equipment designer or end user. *Saftronics* accepts no responsibility for how it's products may be incorporated into the final design.

Under no circumstances should any *Saftronics* product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to dynamically fault detect and fail safe under all circumstances. All products designed to incorporate a component part manufactured by *Saftronics*, must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation. Any warnings provided by *Saftronics* must be passed through to the end user.

Saftronics offers an express warranty only as to the quality of it's products to conform to the catalog specifications. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED. *Saftronics* assumes no liability for any personal injury, property damage, losses or claims, arising out of the mis-application of it's products.