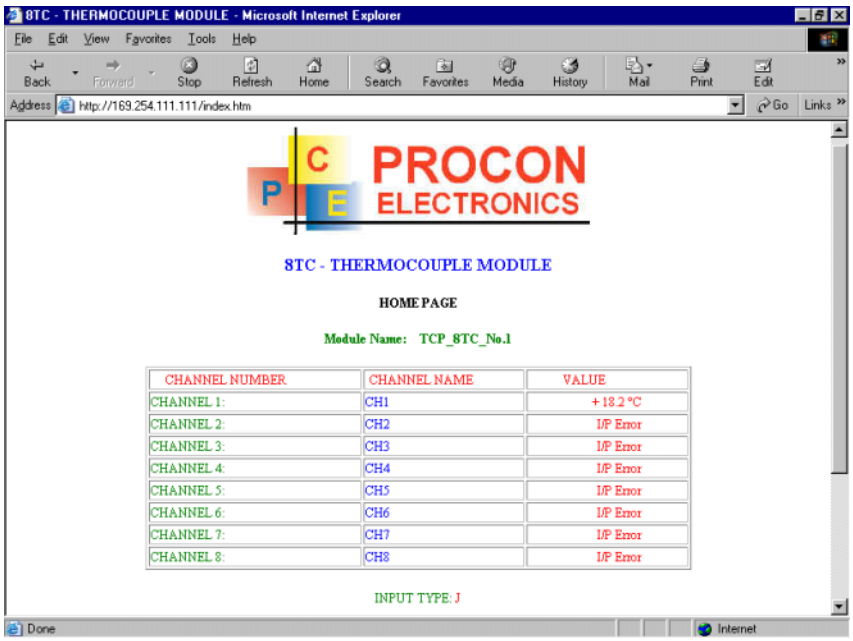
MOD-MUX

MODBUS TCP I/O PRODUCTS



CATALOG AND DESIGN GUIDE

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1. AN OVERVIEW OF THE MOD-MUX TCP I/O SYSTEM

1.1 DESCRIPTION

MOD-MUX **TCP** is an innovative modular I/O system which provides a simple solution for distributed I/O requirements. The MOD-MUX system consists of stand-alone Digital and Analog Input and Output modules which are connected together on an **ETHERNET** 10Base-T network using the **MODBUS TCP** protocol.

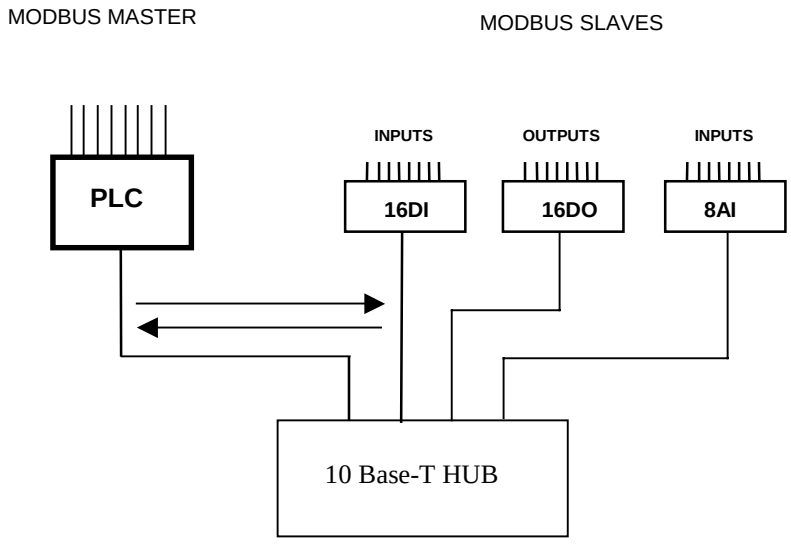
The MOD-MUX TCP modules also have built in web servers. This enables configuration and diagnostic data to be accessed via a standard web browser.

All MOD-MUX modules plug into industry standard DIN rail mount 11 pin relay bases. All modules have a minimum isolation of 1000VAC rms between the field and logic.

There are a number of configurations in which the MOD-MUX modules may be used in a system. Some are listed as follows:

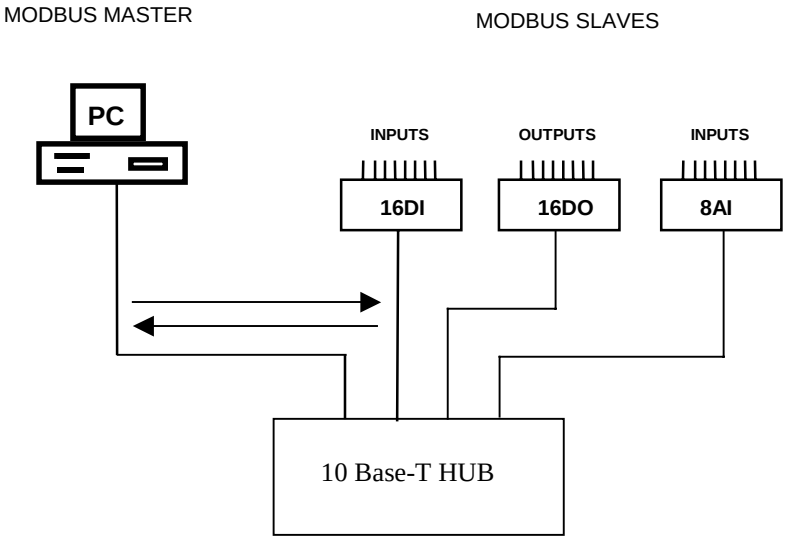
A. I/O Expansion.

There are a number of devices such as **PLC**'s (Programmable Logic Controllers) which have a MODBUS TCP Communications facility available. When configured as a MODBUS Master, and attached to the Ethernet network, MOD-MUX TCP Modules may be used as remote I/O reducing cabling costs and increasing the I/O capability of the PLC.



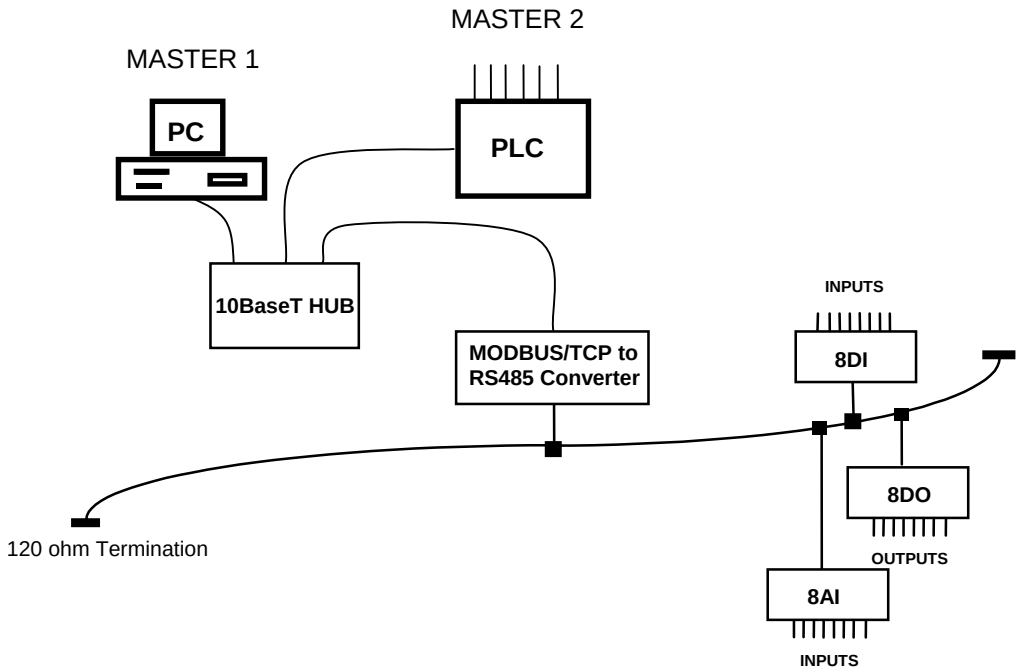
B. Data Acquisition.

Another use of the MOD-MUX TCP Modules is for Data Acquisition where a **PC** (Personal Computer) is connected to the Network. Many SCADA software packages support the MODBUS TCP Master Protocol and can hence retrieve data from Input Modules or send data to Output Modules.



C. Ethernet to RS485 Converter.

Procon has developed a Converter which connects to a standard 10Base-T Ethernet network. The Converter is given a network IP address and can be accessed by up to 4 PC's at a time. The converter enables PC's and PLC's using the MODBUS/TCP protocol to communicate with the range of MOD-MUX modules on RS485.



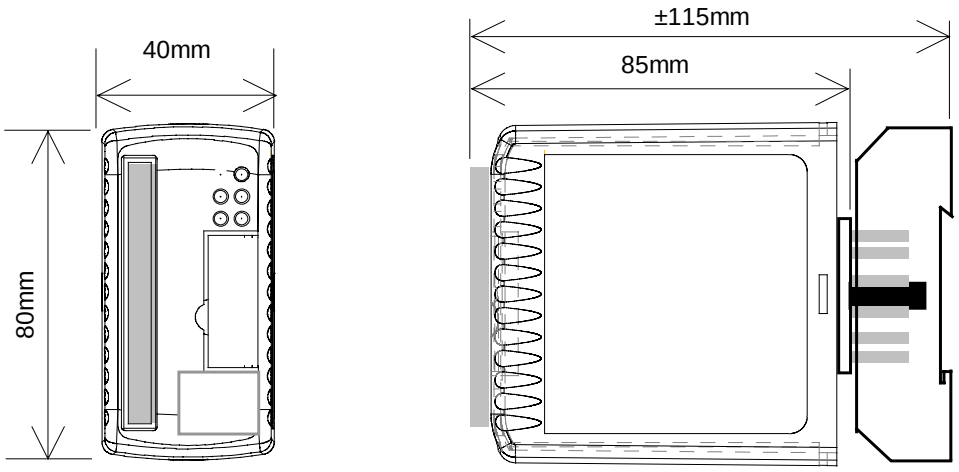
1.2 MODULE SELECTION TABLE

MODEL	MODULE TYPE
POWER SUPPLIES	
MMPSU150	220VAC / 2 x 12Vdc UNREG.POWER SUPPLY 150mA
MMPSU151	220VAC / 24Vdc UNREG.POWER SUPPLY 150mA
I/O MODULES	
MMTCP16DI	16 DIGITAL INPUT MODULE INCLUDING 8 COUNTERS
MMTCP16DO	16 DIGITAL OUTPUT MODULE
MMTCP8DIO	8 DIGITAL INPUT / 8 DIGITAL OUTPUT MODULE
MMTCP8AI/V	8 ANALOG INPUT 0 - 5V / 1 - 5V / 0 - 10V / 2 - 10V
MMTCP8AI/V ISO	8 ANALOG INPUT 0 - 1/10V FULLY ISOLATED
MMTCP8AI/I	8 ANALOG INPUT 0 - 20mA / 4 - 20mA
MMTCP8AI/I ISO	8 ANALOG INPUT 0 - 20mA FULLY ISOLATED
MM8TCPAO	8 ANALOG OUTPUT MODULE
MMTCP8TC	8 THERMOCOUPLE INPUT MODULE INCL. 0 - 50mV I/P
MMTCP8TCISO	8 TC INPUT MODULE INCL. 0 - 50mV I/P FULLY ISOLATED
MMTCP6RTD	6 RTD INPUT MODULE - PT100 & Ni120
MMTCP6RTDB	6 RTD INPUT MODULE - PT1000
MMTCPDIOAIO	2 RTD I/P, 2 ANALOG INPUT 0(4) - 20mA / 0(2) - 10V, 1 ANALOG OUTPUT 0(4) - 20mA / 0(2) - 10V, 5 DIGITAL INPUTS, 2 DIGITAL OUTPUTS
COMMUNICATION MODULES	
MMTCPCONV	MODBUS/TCP RS232/485 CONVERTER
MMTCPBCONV	MODBUS/TCP RS232/485 BOXED CONVERTER
MMTCPMCONV	MODBUS MASTER SERIAL/TCP CONVERTER
ACCESSORIES	
MM11PINBASE	11 PIN DIN RAIL MOUNT BASE

2. MOD-MUX GENERAL INFORMATION

2.1 PHYSICAL DIMENSIONS

The MOD-MUX enclosure is shown below. The module plugs into an industry standard 11 pin relay base. This base is normally clipped onto a DIN rail. Field wiring is on the front of the module via a separate plug in connector.



External dimensions of a typical module. Extra space will be required in the front for field wiring.(Approx. 25mm)

2.2 GROUNDING/SHIELDING

In most cases, MOD-MUX modules will be installed in an enclosure along with other devices which generate electromagnetic radiation. Examples of these devices are relays and contactors, transformers, motor controllers etc. This electromagnetic radiation can induce electrical noise into both power and signal lines, as well as direct radiation into the module causing negative effects on the system. Appropriate grounding, shielding and other protective steps should be taken at the installation stage to prevent these effects. These protective steps include control cabinet grounding, module grounding, cable shield grounding, protective elements for electromagnetic switching devices, correct wiring as well as consideration of cable types and their cross sections.

3. CONFIGURATION

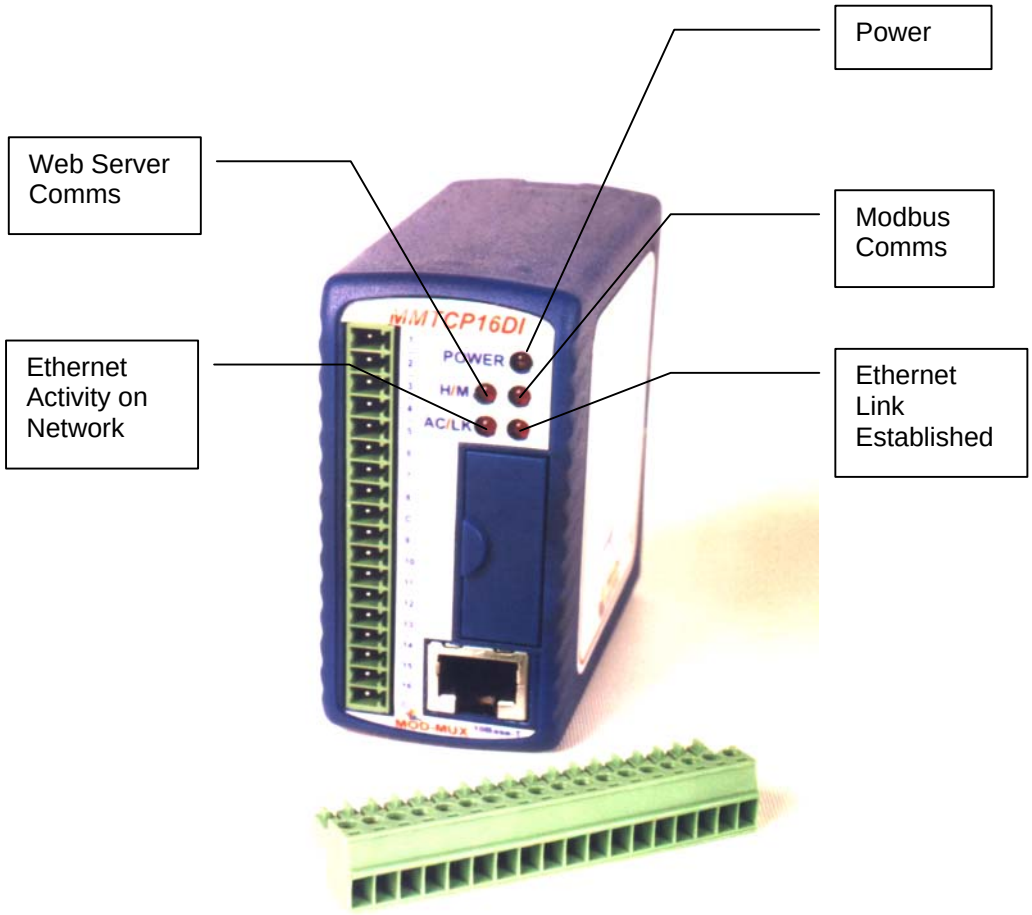
3.1 HARDWARE CONNECTIONS.

The MOD-MUX TCP Module must be plugged into an 11-PIN relay base. Power must be applied to terminal 1 (+12/24VDC) and terminal 2 (0V). The power LED will illuminate and all LED's will be off.

Next the Ethernet connection is required, either through a network or directly to a PC. The Ethernet interface uses a standard RJ45 connector.

3.2 FRONT PANEL LED'S.

The led's on the front panel of the MOD-MUX TCP Module are used to indicate the operation of the module.



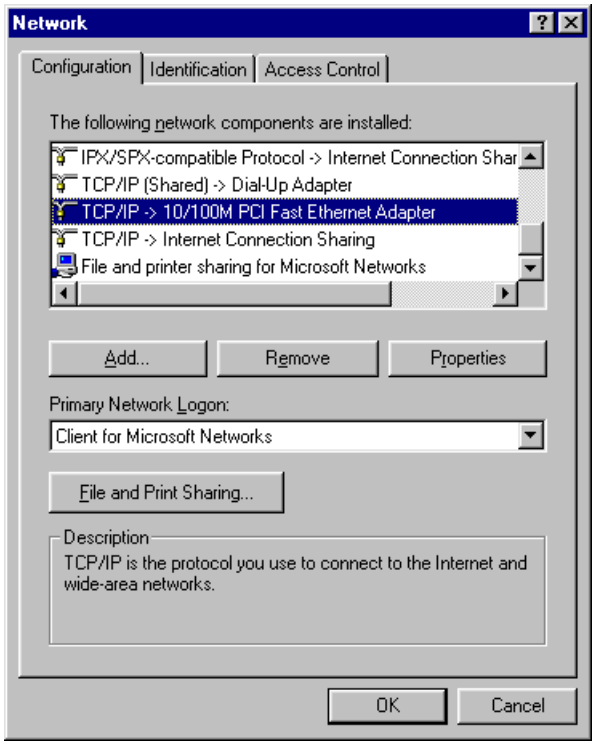
3.3 CONNECTING TO A PC WHICH IS NOT CONNECTED TO A NETWORK.

If the PC is equipped with an Ethernet card but not connected to a network, a local network address should be used for communication between the MOD-MUX TCP Module and the PC. The MOD-MUX TCP Module is shipped with a default IP address 169.254.111.111. This address is in the address area reserved for local networks not

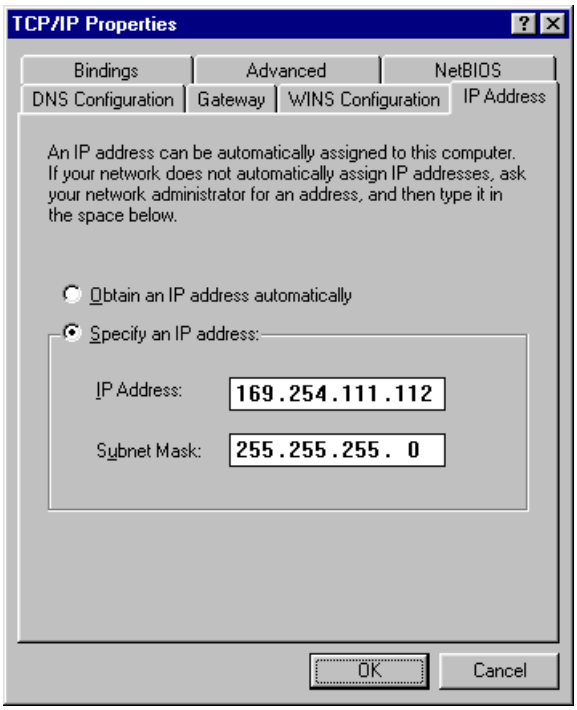
connected to the Internet. For direct connection between the PC and the MOD-MUX TCP Module, a crossover Ethernet cable is required.

To setup your PC to connect directly to the MOD-MUX TCP Module, an IP address in the same range as the MOD-MUX TCP Module must be assigned to the PC. In Windows environments, this should be done as follows:

- Connect the PC and the MOD-MUX TCP Module together using a crossover cable
- Open the Windows Control Panel
- Select Network
- Select TCP/IP -> the PC's Ethernet adaptor from the Configuration tab as shown below



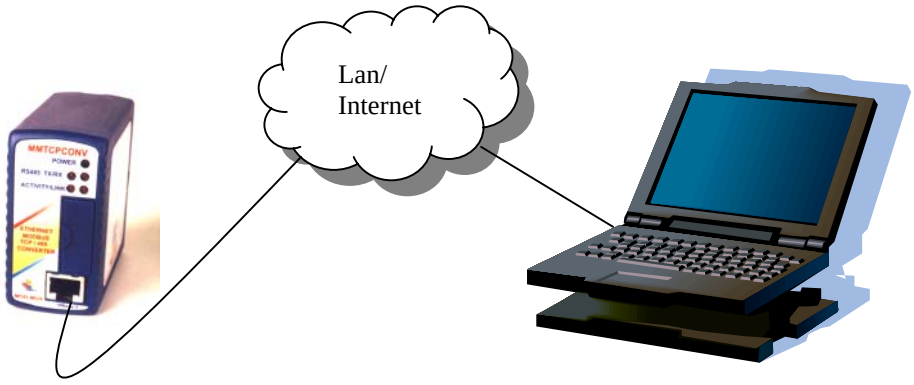
- Click the properties button. A TCP/IP Properties box similar to the one below should appear



- Select the IP Address tab
- Choose to Specify an IP address as shown in the figure
- Insert the IP address 169.254.111.112 and the corresponding subnet mask as shown
- Save your settings by pressing OK in both TCP/IP properties and Network properties
- Reboot your PC

3.4 CONNECTING TO A PC WHICH IS CONNECTED TO A NETWORK.

If there is an Ethernet network available, the MOD-MUX TCP Module can be connected to any Ethernet connection or hub belonging to the network. If the PC is connected to a network, there is a strong possibility that the default IP address of the MOD-MUX TCP Module is outside the range of the network (the address doesn't belong to the IP subset of the network). If the Ethernet network is connected to the Internet, this is certain. In this case a new IP address for the MOD-MUX TCP Module is required. Contact the local network administrator to be assigned a free IP address for the MOD-MUX TCP Module. The new IP address is programmed into the MOD-MUX TCP Module using a Web browser software such as Internet explorer. In this case the MOD-MUX TCP Module must first be connected directly to a PC as described above in section 3.2.



In the remainder of this chapter, the IP address 169.254.111.111 is used as an example. Exchange this IP address with the IP address you have set up in all the occurrences.

3.5 TESTING THE CONNECTION

To test the connection between the PC and the MOD-MUX TCP Module, a simple program called *ping* can be used. *Ping* sends a number of messages to the specified IP address and displays the response. The ping program can be run from the command line or from a DOS window on the PC, as follows:

- Open the Windows Start Menu
- Click Run
- In the Open box, type: "ping 169.254.111.111"

If the network connection is OK, the program will respond with:
"Reply from 169.254.111.111" and information about the response time.

If there is a problem with the network setup the program will respond:
"**Destination host unreachable**". There may be two solutions to this problem:

- If the PC is connected in a network, change the IP address to an address accessible from the local network.
- If the MOD-MUX TCP Module is connected directly to the PC(or through a hub), change the PC's IP address to one in the same address range as the MOD-MUX TCP Module.

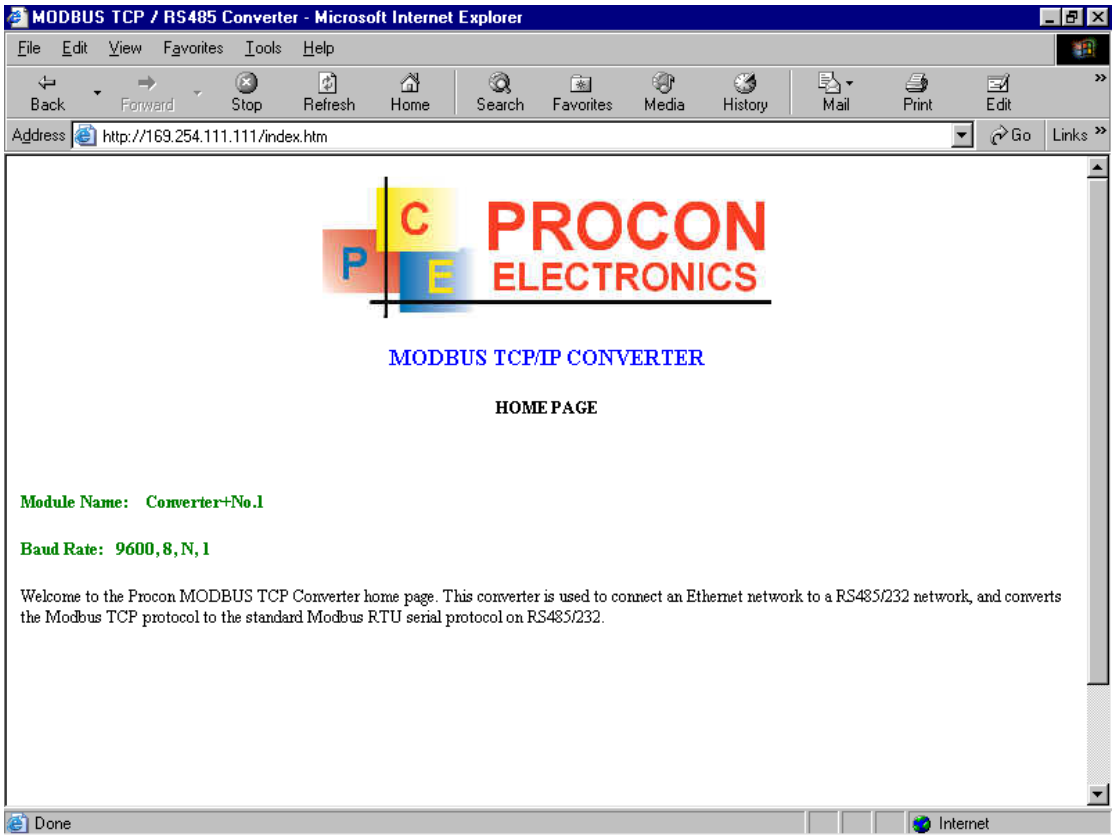
If there is a problem with the MOD-MUX TCP Module the program will respond:
"**Request timed out**", this means that the MOD-MUX TCP Module can not respond to messages. Check the power connection. Check that the Link LED is illuminated when the cable is plugged into the RJ45 connector.

3.6 VIEWING WEB PAGES

The MOD-MUX TCP Modules have built in web pages. These are used for checking the configuration and dynamic data, and for altering the configuration. To view these Web pages, a Web browser such as Internet Explorer or Netscape is needed.

When using the MOD-MUX TCP Modules there is no DNS (Domain Name Server) to recognize the IP address and assign a symbolic name for it (for instance www.proconel.com). To use symbolic names, contact the local network administrator and ask for a symbolic name for a specified IP address.

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page of the MOD-MUX TCP Module will now be displayed in the browser window.



If no Web page is displayed, go back to testing the network connection to the MOD-MUX TCP Module by using the ping command. If the MOD-MUX TCP Module replies to the ping messages, check the setup of the Web browser. If the MOD-MUX TCP Module is directly connected to the same network as the PC, "direct connection to the network" or "bypass proxy server for local addresses" should be selected in the Web browser configuration menu. If the MOD-MUX TCP Module is connected to the PC through a firewall, a proxy server should be selected in the configuration menu. Contact the local network administrator for information about the network configuration.

3.7 TROUBLESHOOTING GUIDE.

No	Checkpoint		Solution
1	Is the LINK LED on and is the ACTIVITY LED flashing with short pulses?	No	No network connection is detected. The Ethernet cable is either not plugged in or wrong type of cable is used. For connection to a network with a hub or switch, a normal network cable can be used. For direct connection to a PC network card, a twisted cable must be used.
		Yes	A network connection is detected, the MOD-MUX TCP Module is connected to the network.
2	Does the MOD-MUX TCP Module respond to PING requests?	No	Either the PC or the MOD-MUX TCP Module is setup with wrong IP address. To change the IP address of the MOD-MUX TCP Module back to the default address, open the MOD-MUX TCP Module housing and remove the jumper labeled SIP2. Apply power to the MOD-MUX TCP Module for a short while. Now replace the jumper and close the enclosure. To change the IP address of a PC, use the Windows "control panel -> network -> TCP/IP properties" and setup an IP address close to the MOD-MUX TCP Module address. The MOD-MUX TCP Module is shipped with a default IP address of 169.254.111.111, the PC can be setup with an IP address of 169.254.111.112
		Yes	The PC and MOD-MUX TCP Module are setup with a correct IP address and they are able to communicate with each other.
3	Can the default Web page be accessed in a Web browser?	No	This is normally caused by the setup of the Web browser. In the "options" or "preferences" menu, check that the Web browser is configured for direct network connection or local area network and **NOT** using a proxy server.
		Yes	No problems.

4. MOD-MUX HARDWARE

4.1 POWER SUPPLIES

4.1.1 DESCRIPTION

There are two power supplies in the MOD-MUX product range.

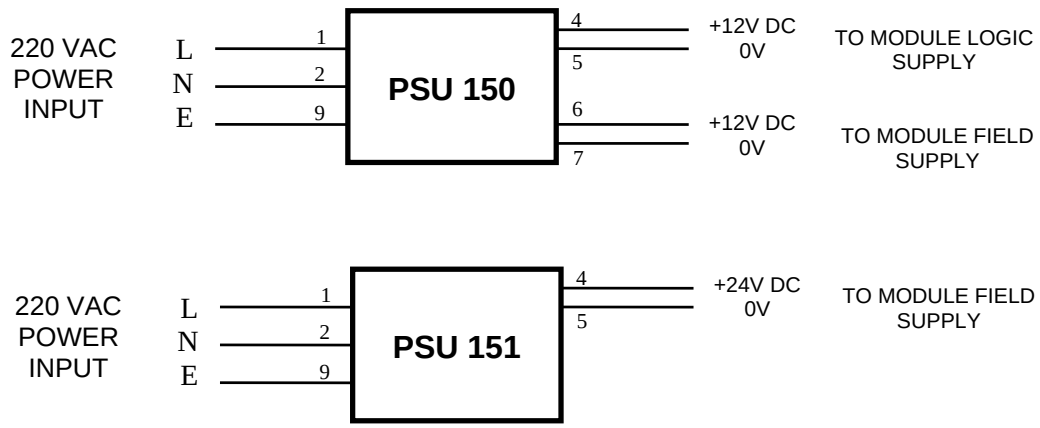
The MMPSU150 is a dual isolated unregulated 12VDC power supply designed such that one power supply output is connected to the logic supply input on a MOD-MUX I/O module whilst the second supply output is connected to the field supply input on the MOD-MUX I/O module. This is done to ensure isolation between the field and logic on all modules.

The MMPSU151 is a single unregulated 24VDC power supply and is used to power field wiring such as dry contacts for inputs or the output of the MM8AO current output module.

4.1.2 SPECIFICATIONS

Power Supply:	200 - 260VAC @ 3VA 50/60 Hz
Outputs:	MMPSU150 - 2 X Isolated 12 Vdc UNREG @ 300mA each MMPSU151 - 1 X 24 Vdc UNREG @ 300mA
Connector:	11 Pin Connector on rear of unit

4.1.3 WIRING



4.2 MMTCP16DI - DIGITAL INPUTS WITH COUNTERS

4.2.1 DESCRIPTION

The MMTCP16DI module is a 16 channel digital input module. The inputs are isolated from the logic by bi-directional opto-couplers. The inputs are divided into 2 isolated groups of 8 inputs each. This allows for many configurations in which the input module may be used. One such configuration could be where one group is connected as common positive and the second group connected as common negative.

The counters operate in three modes.

In **mode 0** all the counters are disabled.

In **mode 1** the first eight inputs (1-8) have internal counters associated with them. These counters are 32 bit counters allowing a count value from 0 to 4294967295. The count value can be cleared by writing a zero to the associated registers or preset to any other value using the same method.

In **mode 2** the inputs are connected as up/down counters. Input 1 will increment counter 1 whilst input 2 decrements counter1. In the same way, inputs 3&4 operate counter 2, inputs 5&6 operate counter 3 and inputs 7&8 operate counter 4.

Note: The count values are not battery backed-up and will be lost if power is turned off.

The format of the registers allows the status of the inputs to be read as either single bits or all at once as a single register on the Modbus network.

Each MMTCP16DI Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP16DI Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the digital input status parameters is http://169.254.111.111/index.htm and the address for viewing the counters is http://169.254.111.111/counters.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm and the web page for configuring the counters is http://169.254.111.111/countcfg.htm .

4.2.2 SPECIFICATIONS

Power Supply: 10 -26 Vdc @ 140 mA

Inputs:

Supply Voltage	10 - 26 Vdc
Supply Current	16 X 4 mA @ 12Vdc / 16 X 8 mA @ 24Vdc
Isolation	1500Vrms between field and logic

Counters:

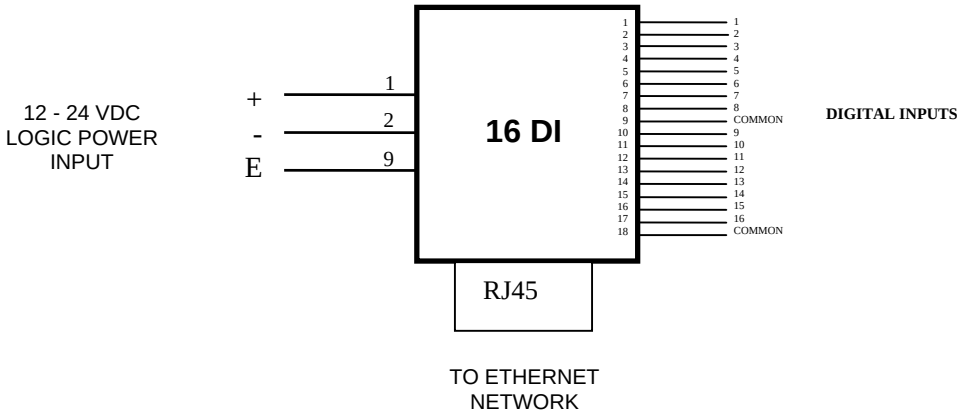
Inputs	1 to 8
Resolution	32 Bits
Frequency	500 Hz (Max)
Pulse Width	1ms (min)

Ethernet: 10BaseT - 10Mbits/s twisted pair

Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10Base-T Ethernet

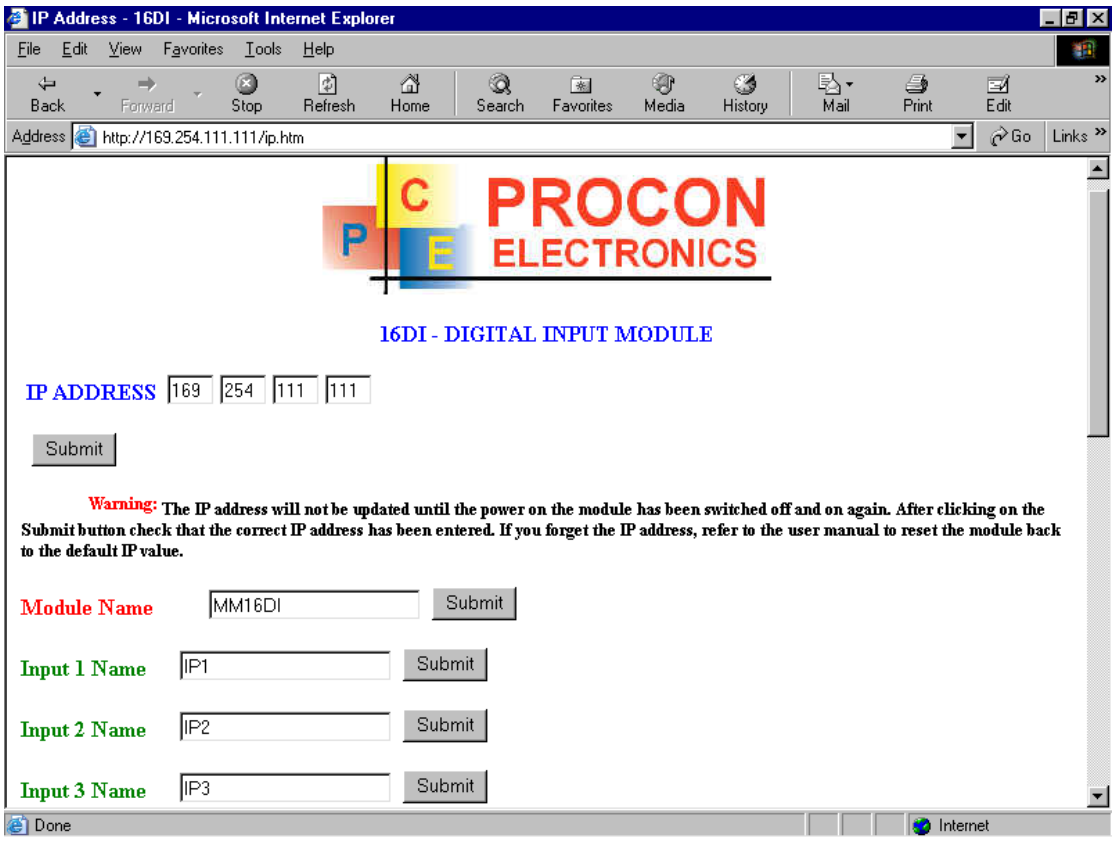
Note: Inputs 1 to 8 are used as both digital inputs and counter inputs.

4.2.3 WIRING



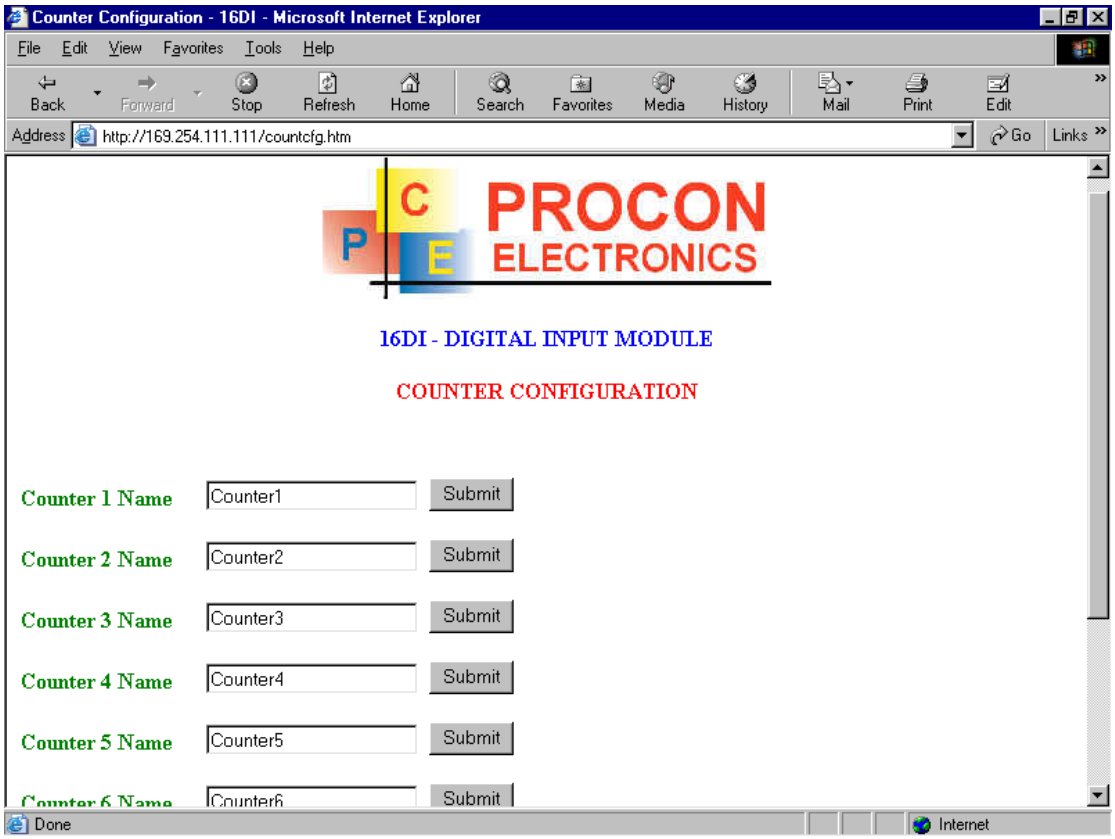
4.2.4 CONFIGURATION

The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

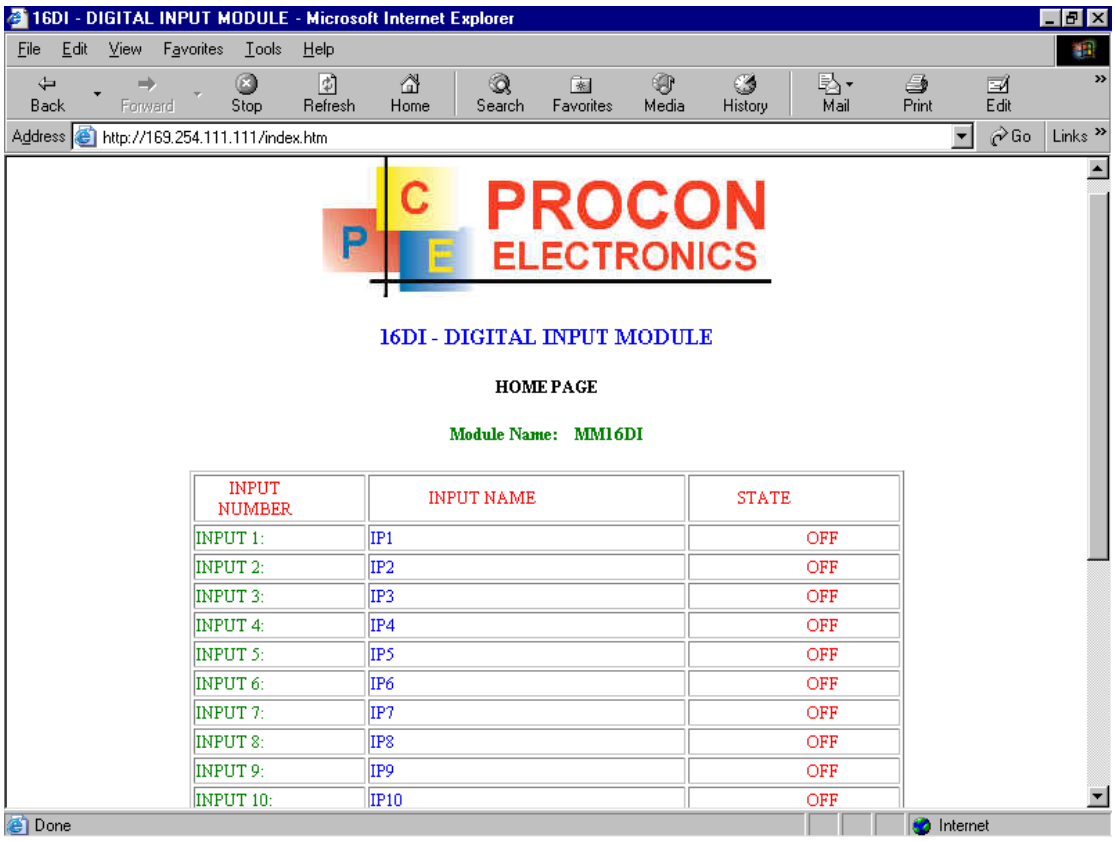
The Web page address "**169.254.111.111/countcfg.htm**" is entered into the address line of the browser window to access the counter configuration page. This page allows you to enter a Counter Description Name for identification/maintenance purposes.



- **Counter Names:** These fields allow you to enter a counter description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular counter by name or number.

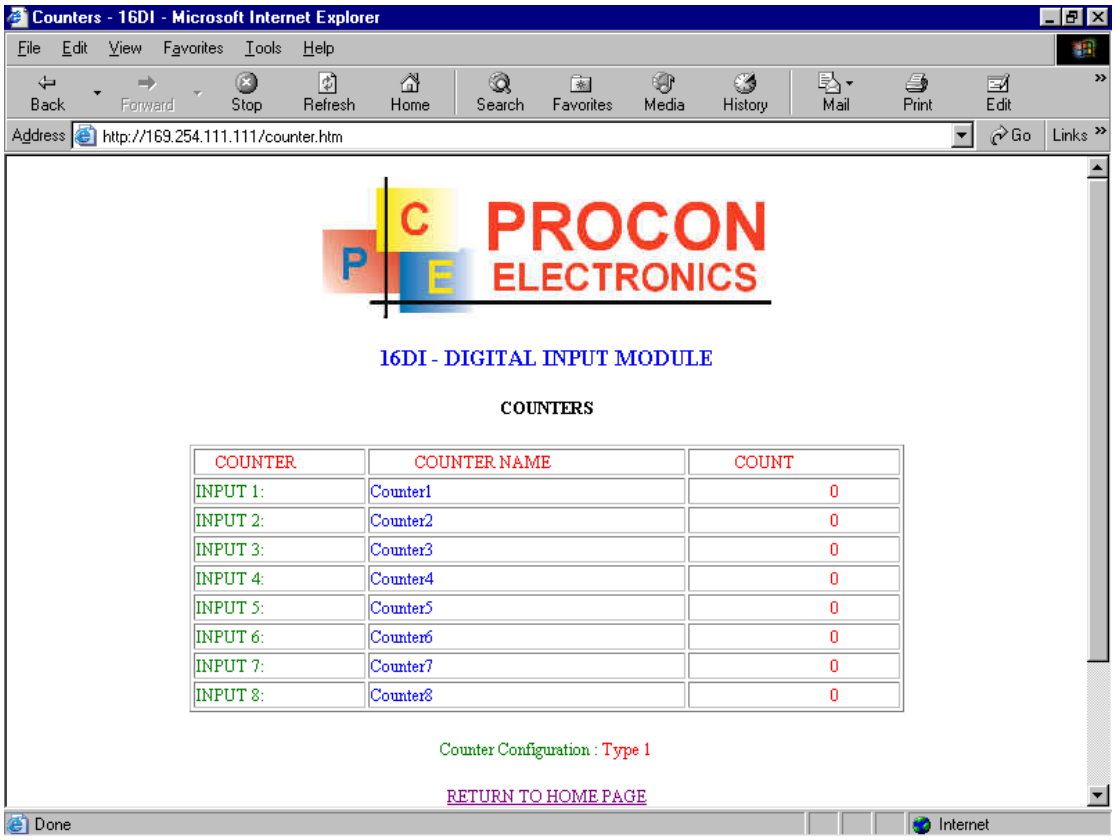
4.2.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Input Number:** This refers to the actual input number on the terminals of the module.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **State:** This is the current state of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Counter Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/counter.htm**" into the address line of the browser window.



- **Counter:** This refers to the actual input number on the terminals of the module.
- **Counter Name:** This is the name that was entered in the configuration page to best describe the counters.
- **Count:** This is the current count on the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.
- **Counter Configuration:** This is the mode as described at the beginning of this section.

4.3 MMTCP16DO - DIGITAL OUTPUTS

4.3.1 DESCRIPTION

This module has 16 open collector (NPN) digital outputs. The outputs may be used to drive lamps or external relays when more drive capability is required. The outputs are isolated from the logic and they share a common negative terminal.

The outputs are written to by the Modbus master device such as a PC or PLC. Each output can be individually switched on or off, or all outputs can be set up at the same time by writing a single number to the output register which represents the status of all outputs.

An output watchdog timer can be configured to switch off all the outputs if there has been no communications with the module for up to 255 seconds. A value of 0 seconds will disable this timer and the outputs will remain in the last programmed state.

Each MMTCP16DO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP16DO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the digital output status parameters is http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.3.2 SPECIFICATIONS

Power Supply:	(Logic)	10 - 26 Vdc @ 140 mA
	(Field)	20 - 26 Vdc @ 50 mA

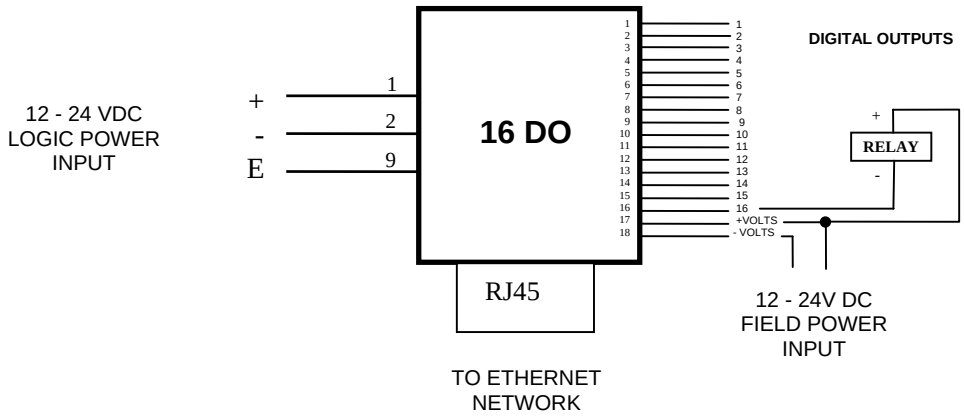
Outputs: Open Collector NPN

Maximum Voltage	36 Vdc
Maximum Current	100 mA
Isolation	1500Vrms between field and logic
Vceon	1.1V Max.

Ethernet: 10BaseT - 10Mbits/s twisted pair

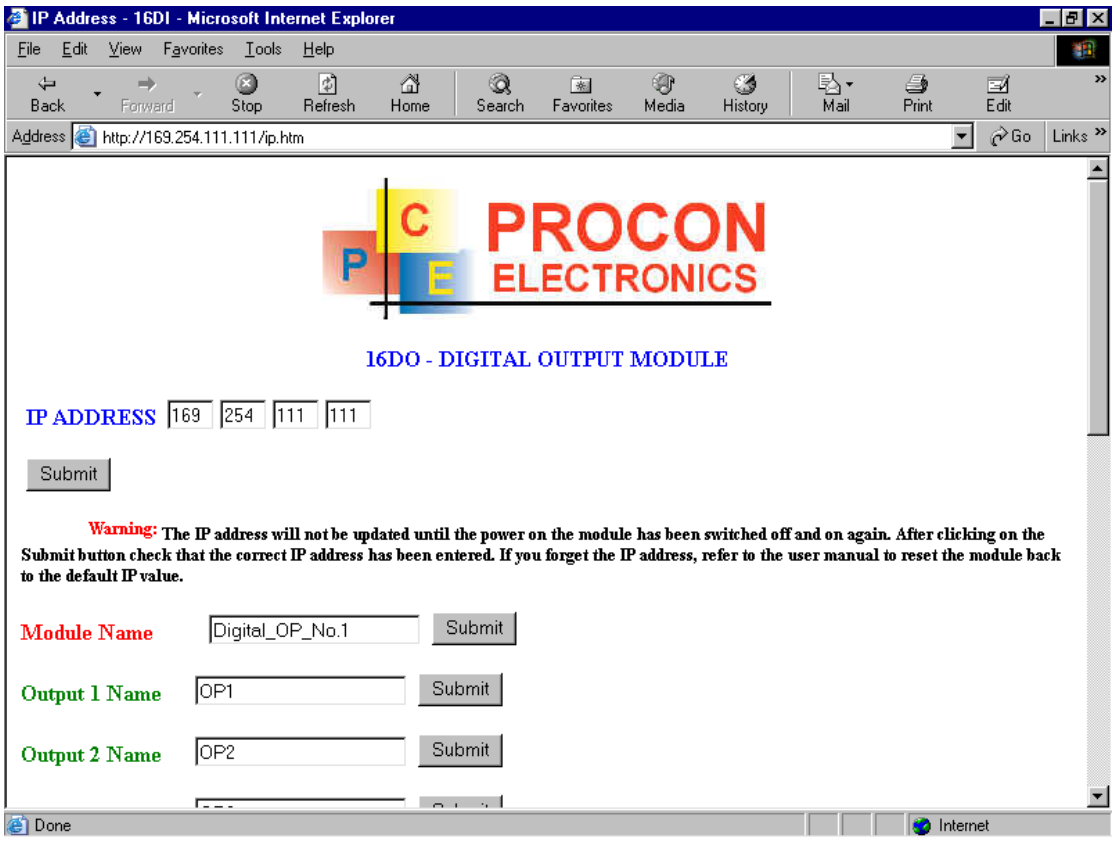
Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10Base-T Ethernet

4.3.3 WIRING



4.3.4 CONFIGURATION

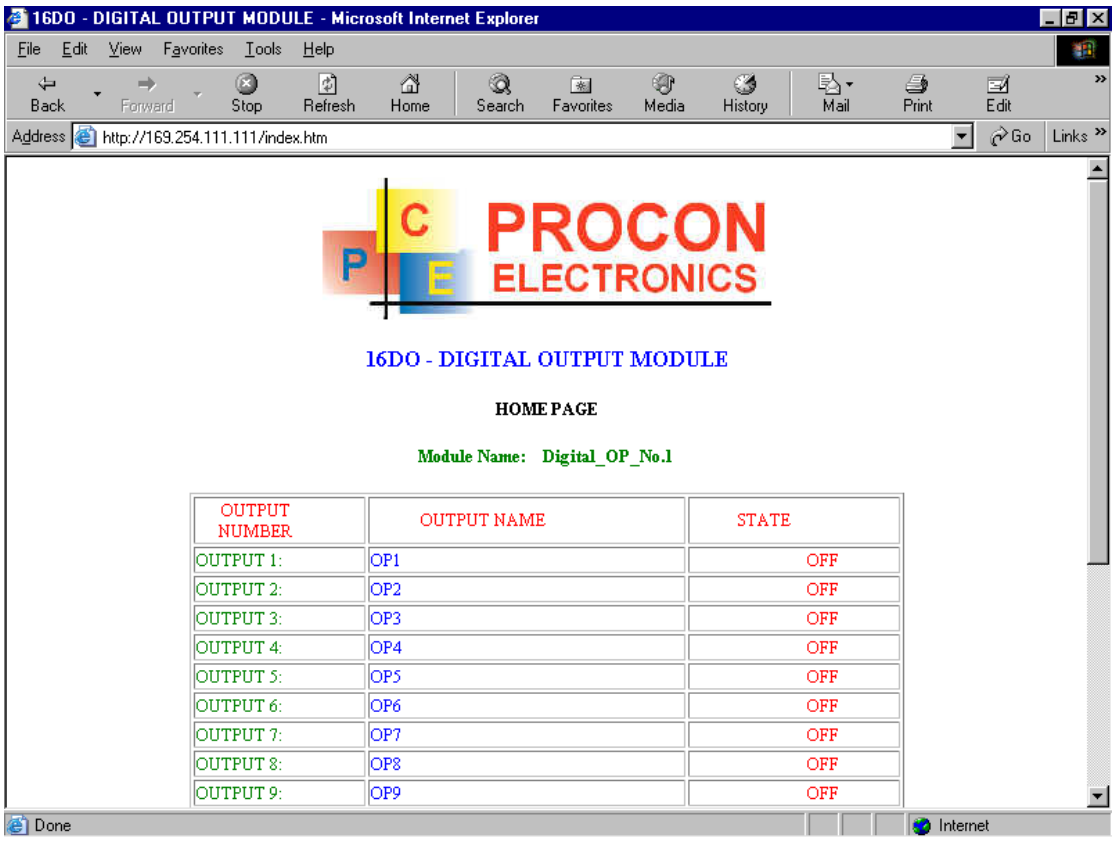
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Output Names:** These fields allow you to enter an output description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular output by name or number.

4.3.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Output Number:** This refers to the actual output number on the terminals of the module.
- **Output Name:** This is the name that was entered in the configuration page to best describe the outputs.
- **State:** This is the current state of the outputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.
- **Output Watchdog Timer:** This displays the watchdog time for the outputs.

4.4 MMTCP8DIO - DIGITAL INPUTS/OUTPUTS WITH COUNTERS

4.4.1 DESCRIPTION

The MMTCP8DIO module is an 8 channel digital input and 8 channel digital output module.

The inputs are isolated from the logic by bi-directional opto-couplers. The common is connected internally to either the -volts or +volts field power supply terminals using a jumper link which is situated inside the housing.

The counters operate in three modes.

In **mode 0** all the counters are disabled.

In **mode 1** the first eight inputs (1-8) have internal counters associated with them. These counters are 32 bit counters allowing a count value from 0 to 4294967295. The count value can be cleared by writing a zero to the associated registers or preset to any other value using the same method.

In **mode 2** the inputs are connected as up/down counters. Input 1 will increment counter 1 whilst input 2 decrements counter1. In the same way, inputs 3&4 operate counter 2, inputs 5&6 operate counter 3 and inputs 7&8 operate counter 4.

Note: The count values are not battery backed-up and will be lost if power is turned off.

The format of the registers allows the status of the inputs to be read as either single bits or all at once as a single register on the Modbus network.

The 8 digital outputs are open collector (NPN). The outputs may be used to drive lamps or external relays when more drive capability is required. The outputs are isolated from the logic and they share a common negative terminal.

When used as a slave module, the outputs are written to by the Modbus master device such as a PC or PLC. Each output can be individually switched on or off, or all outputs can be set up at the same time by writing a single number to the output register which represents the status of all outputs.

Each MMTCP8DIO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8DIO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the digital input status parameters is http://169.254.111.111/index.htm and the address for viewing the counters is http://169.254.111.111/counters.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm and the web page for configuring the counters is http://169.254.111.111/countcfg.htm .

4.4.2 SPECIFICATIONS

Power Supply:	(Logic)	10 - 26 Vdc @ 140 mA
	(Field)	20 - 26 Vdc @ 50 mA

Inputs:

Supply Voltage	10 - 26 Vdc
Supply Current	8 X 4 mA @ 12Vdc / 8 X 8 mA @ 24Vdc
Isolation	1500Vrms between field and logic

Counters:

Resolution	32 Bits
Frequency	500 Hz (Max)
Pulse Width	1ms (min)

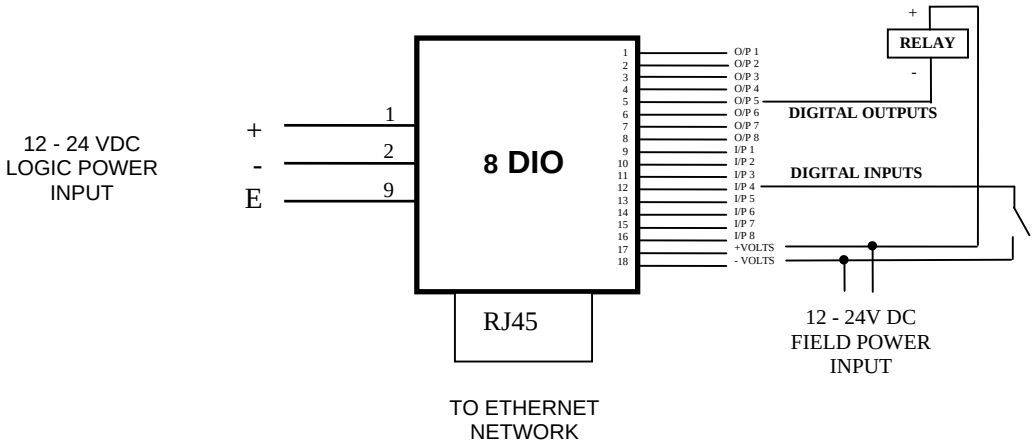
Outputs: Open Collector NPN

Maximum Voltage	36 Vdc
Maximum Current	100 mA
Isolation	1500Vrms between field and logic
Vceon	1.1V Max.

Ethernet:	10BaseT - 10Mbits/s twisted pair
Connector:	11 Pin Connector on rear of unit 18 Way screw connector on front RJ45 on front of module for 10Base-T Ethernet

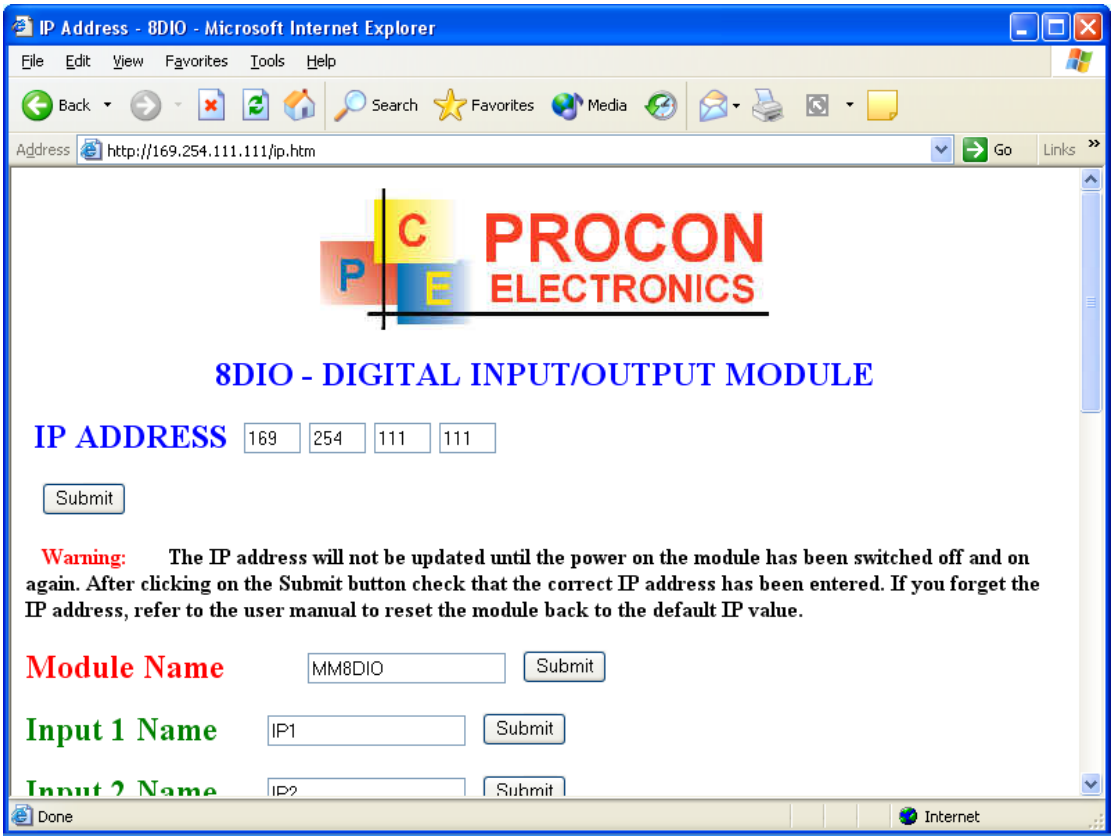
Note: Inputs 1 to 8 are used as both digital inputs and counter inputs.

4.4.3 WIRING



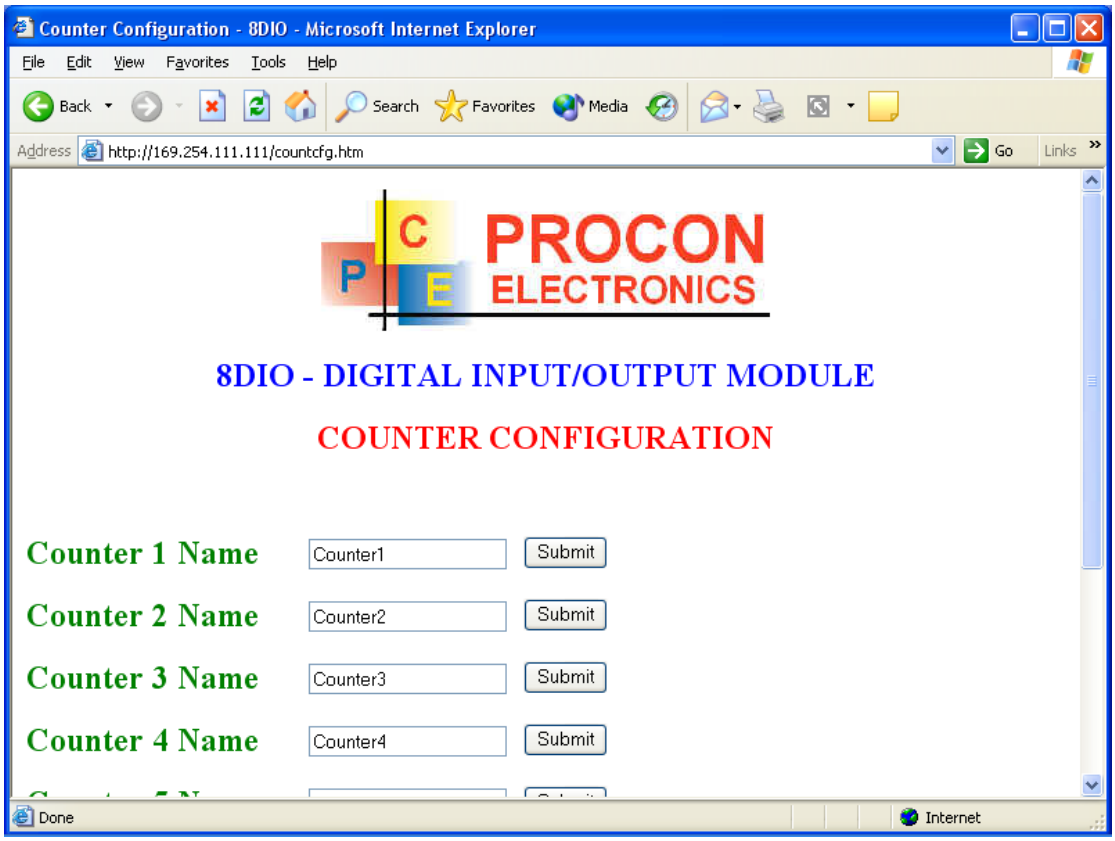
4.4.4 CONFIGURATION

The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input/Output Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input/output by name or number.

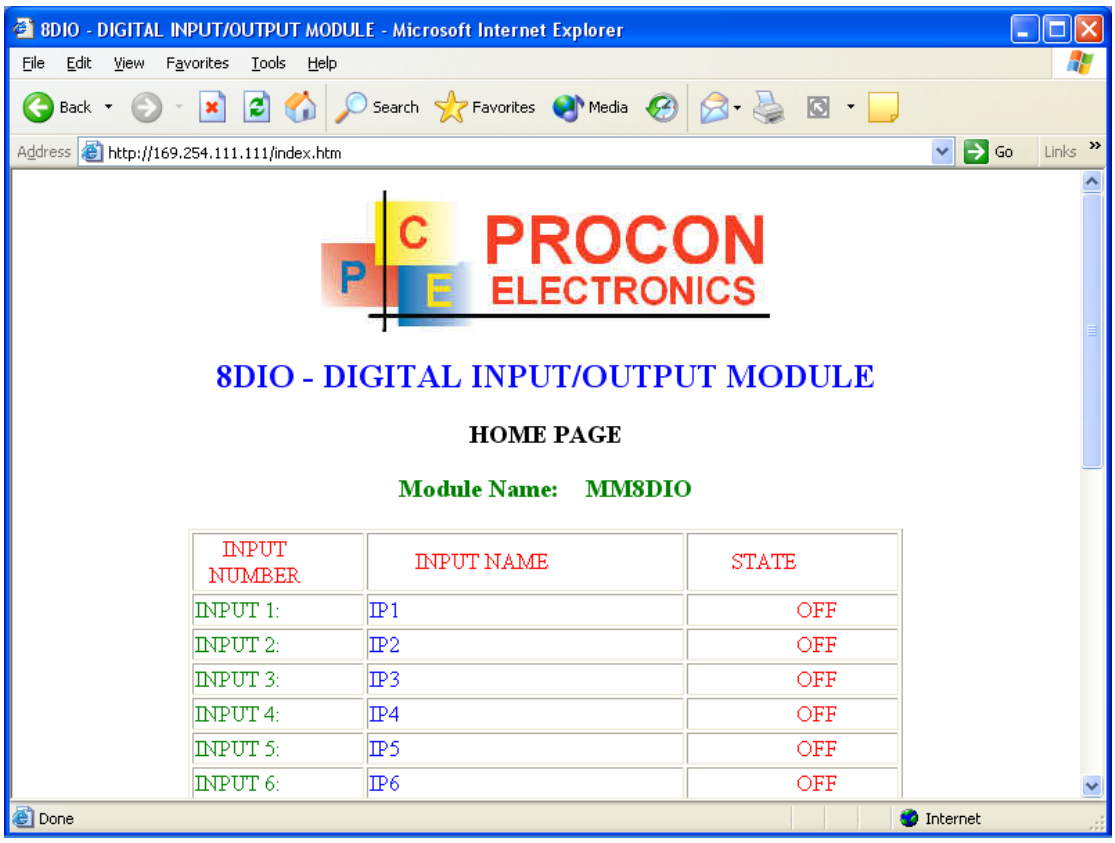
The Web page address "**169.254.111.111/countcfg.htm**" is entered into the address line of the browser window to access the counter configuration page. This page allows you to enter a Counter Description Name for identification/maintenance purposes.



- **Counter Names:** These fields allow you to enter a counter description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular counter by name or number.

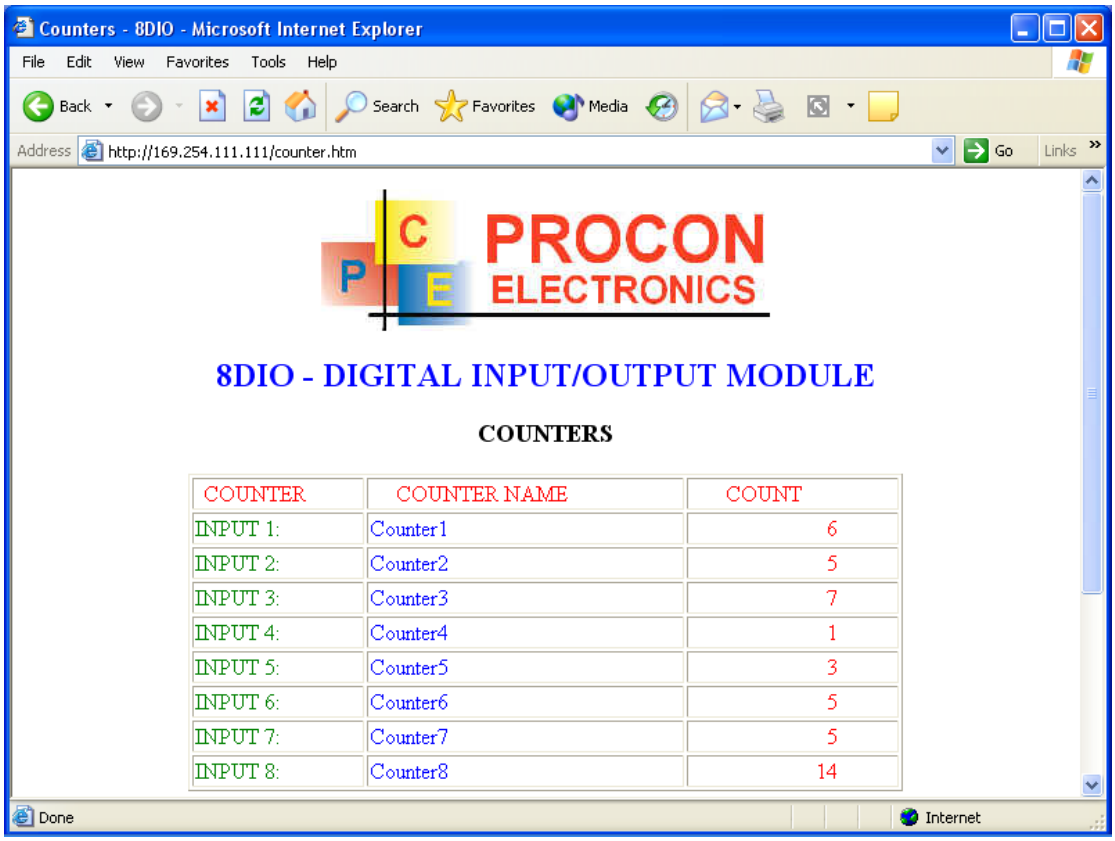
4.4.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Input Number:** This refers to the actual input number on the terminals of the module.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **State:** This is the current state of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.
- **Counter filter:** When this value is zero(0) then the inputs are sampled atr 0.5ms and there is not filtering. This is used for high speed counting. When the value is greater than 0 then the inputs are debounced to prevent faults counting from relay contacts,etc.
- **Output Watchdog:** This is the time that the outputs will keep their active state after communications has stopped. If the value is zero(0) then the outputs will not time out and the last state will remain as long as power is applied to the module.

To view the Counter Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/counter.htm**" into the address line of the browser window.



- **Counter:** This refers to the actual input number on the terminals of the module.
- **Counter Name:** This is the name that was entered in the configuration page to best describe the counters.
- **Count:** This is the current count on the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.
- **Counter Configuration:** This is the mode as described at the beginning of this section.

4.5 MMTCP8AI - ANALOG INPUTS

4.5.1 DESCRIPTION

The Analog Input modules are supplied as either a current input module (MMTCP8AI/I) or a voltage input module (MMTCP8AI/V). The inputs are isolated from the logic and share a common negative terminal.

The standard setting for the MM8AI/I module is 0 - 20mA input current which represents an output value of 0 - 4095 (12 bits) in the corresponding Modbus register. 4 mA would give a reading of 819 ± 1LSB.

The same applies to the MM8AI/V module. An input voltage of 0 - 10Volts represents an output of 0 - 4095 and 2 volts would give a reading of 819 ± 1LSB. An input range of 0(1) to 5Vdc is available by removing the jumper link located on the analogue board inside the enclosure.

Each MMTCP8AI Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8AI Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

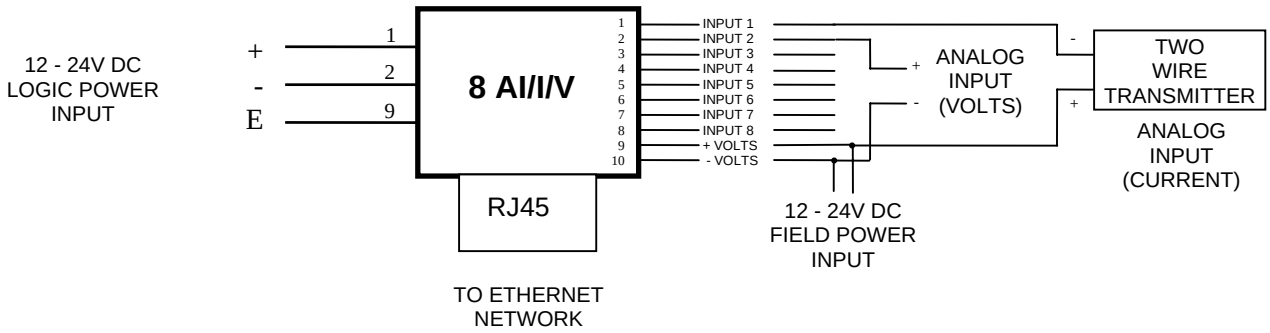
The web page address for viewing the analog input parameters is http://169.254.111.111/index.htm .

The web page address for configuring the module is http://169.254.111.111/ip.htm.

4.5.2 SPECIFICATIONS

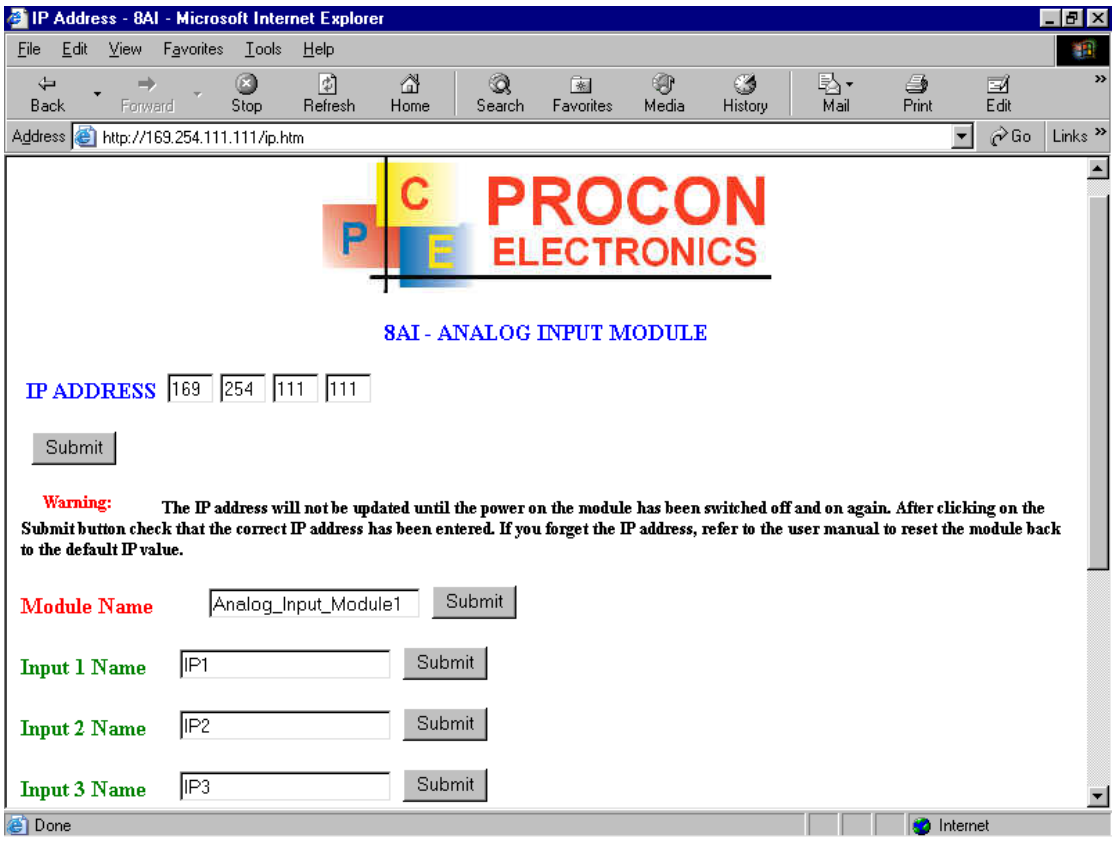
Power Supply: Logic	10 - 26 Vdc @ 140 mA		
Field	10 - 26 Vdc @ 25 mA		
Inputs:			
Voltage	0(2) - 10 Vdc or 0(1) - 5 Vdc	-	8AI/V
Current	0(4) - 20 mA	-	8AI/I
Input Resistance (8AI/V)	20kohms		
Input Resistance (8AI/I)	250ohms		
Resolution	12 bits		
Isolation	1500Vrms between field and logic		
Drift	100ppm/°C		
Accuracy	0.2% of span		
Ethernet:	10BaseT - 10Mbits/s twisted pair		
Connector:	11 Pin Connector on rear of unit		
	10 Way screw connector on front		
	RJ45 on front of module for 10BaseT Ethernet		

4.5.3 WIRING



4.5.4 CONFIGURATION

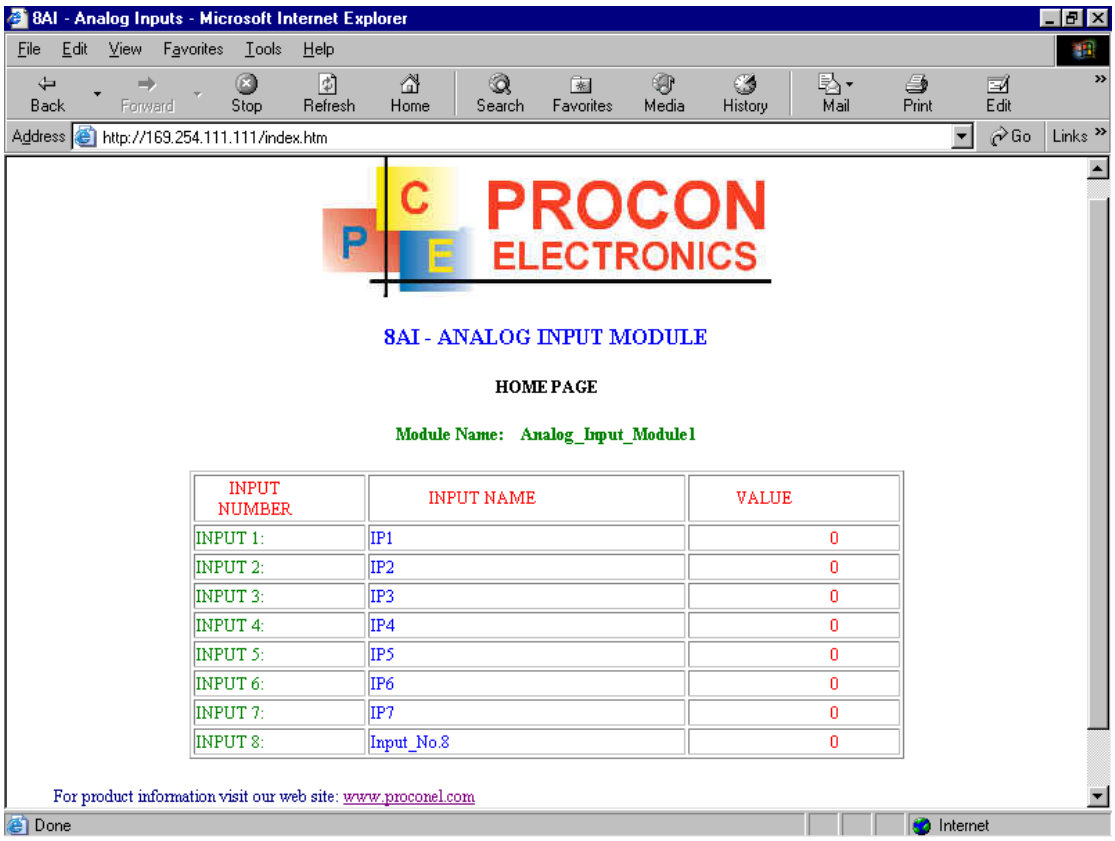
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

4.5.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Input Number:** This refers to the actual input number on the terminals of the module.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **Input Value:** This is the current value of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

4.6 MMTCP8AI/I ISO - ISOLATED CURRENT INPUTS

4.6.1 DESCRIPTION

The MMTCP8AI/I ISO module is a 8 channel isolated current input module. The module uses differential inputs to reduce effects of electrical noise and mains pickup. The current inputs are isolated from the logic and from each other.

The current input can be represented in a number of formats according to the type which is setup by writing a value to the Type register. The value is obtained from the table below.

The standard setting for the MMTCP8AI/I ISO module is 0 - 20mA input current which represents an output value of 0 - 4095 (12 bits) in the corresponding Modbus register. 4 mA would give a reading of 819 ± 1LSB.

The module can also be configured for a 0 – 20.000mA input range or +/- 20.000mA input.

Each MMTCP8AI/I ISO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8AI/I ISO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm. The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.6.2 SPECIFICATIONS

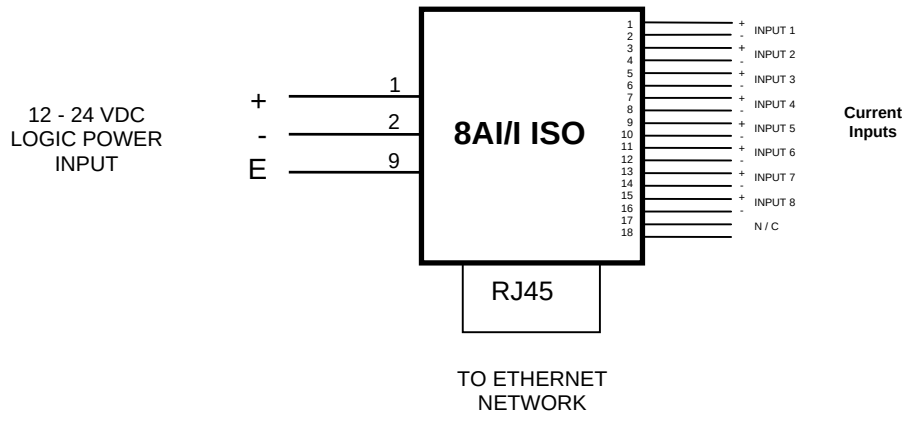
Power Supply: Logic	10 - 26Vdc	90 mA @ 24VDC / 160mA @ 12VDC

Inputs:

Input Type	Range	Resolution
1	0 – 4095	(12 bits)
2	0 – 20.000 mA	1uA
3	+/- 20.000 mA	1uA

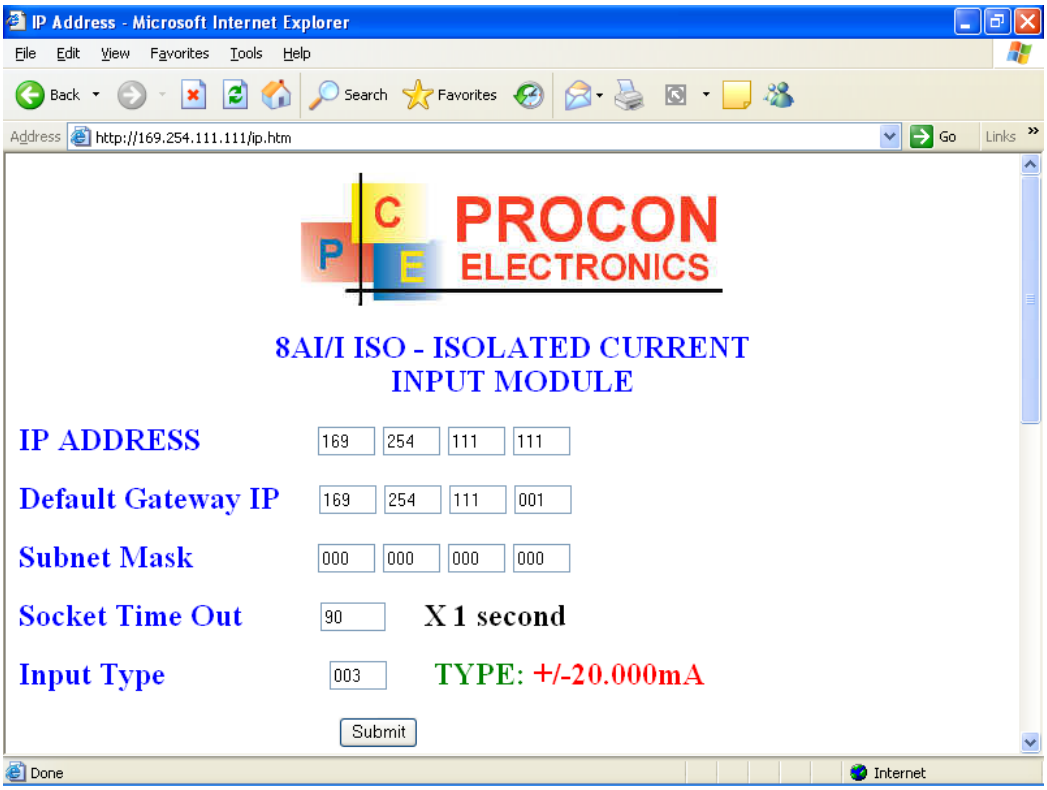
Drift	100ppm/°C Typ.
Isolation	1000Vrms between field and logic 350Vpeak between each current input
Ethernet:	10BaseT - 10Mbits/s twisted pair
Connector:	11 Pin Connector on rear of unit 18 Way screw connector on front RJ45 on front of module for 10Base-T Ethernet

4.6.3 WIRING

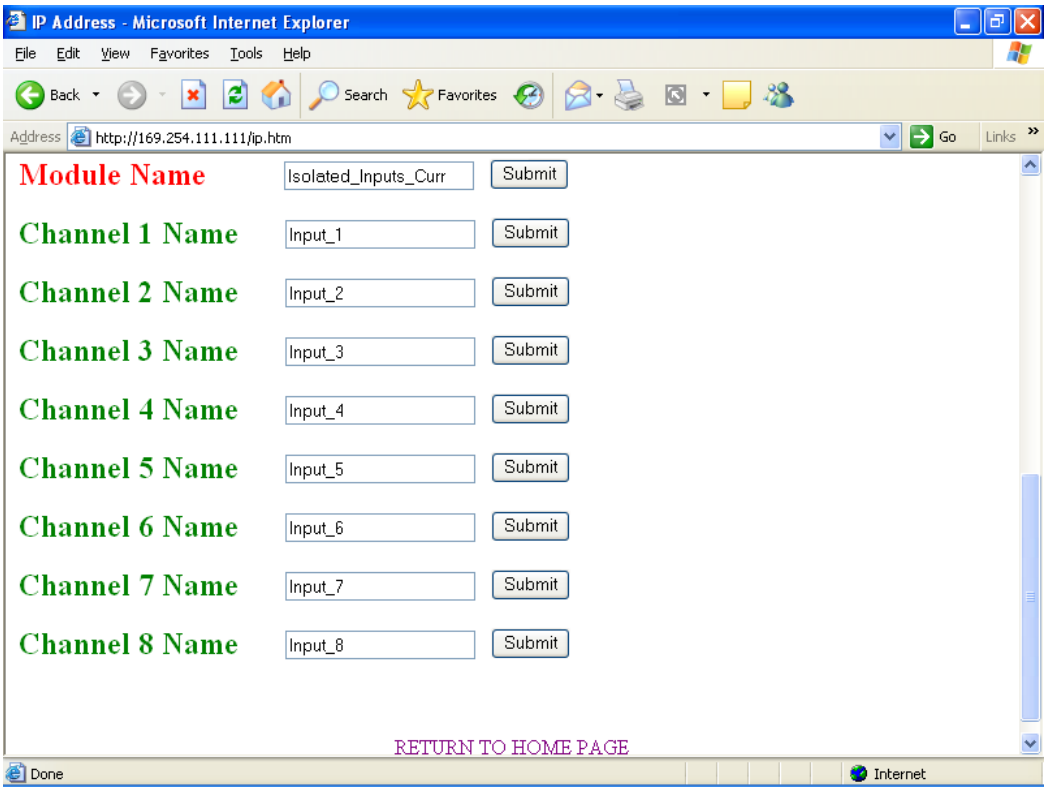


4.6.4 CONFIGURATION

The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address, default gateway and subnet mask of the MOD-MUX TCP Module, select the Input type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



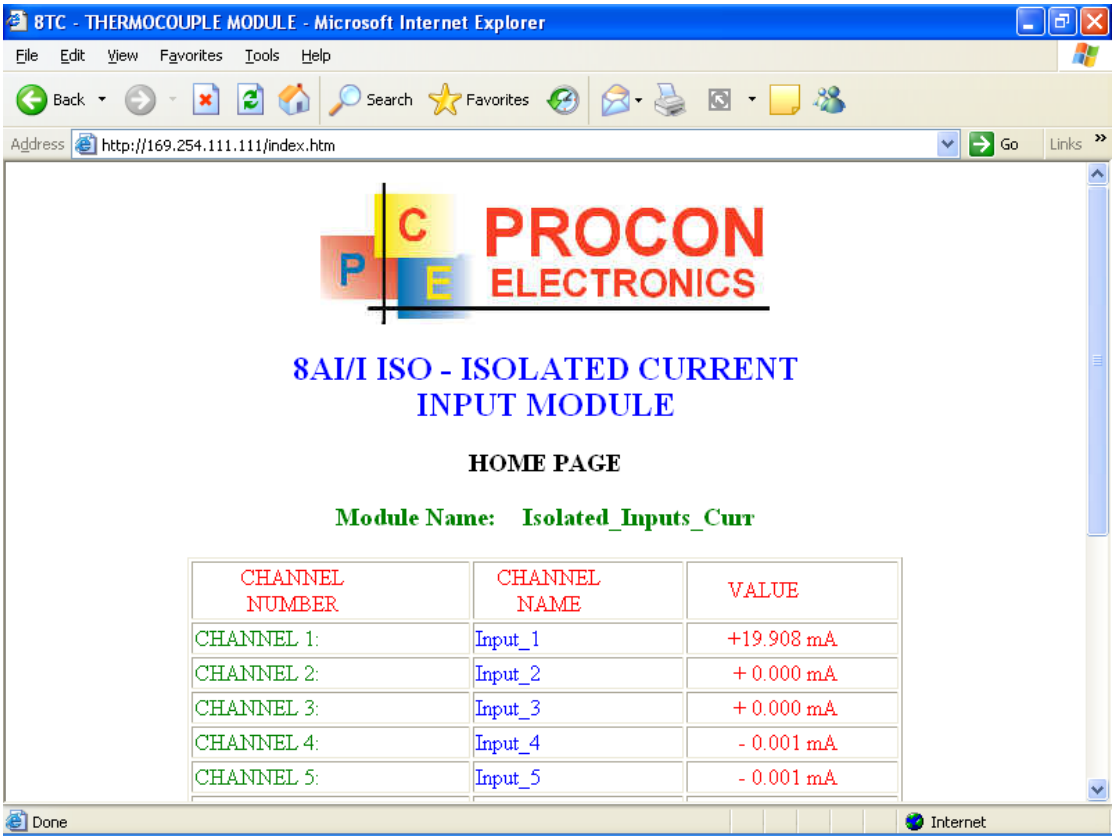
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** If the MOD-MUX TCP Module is on a different network to your PC you may need to setup the IP address of the gateway.
- **Subnet Mask:** The subnet mask must also be entered if the default gateway setting is used. A subnet mask of 000.000.000.000 will disable the default gateway setting.
- **Socket Timeout:** The MOD-MUX TCP Module communicates using sockets which are part of the TCP/IP protocol. The module has 5 sockets. If a communication link is lost with the Modbus master, then there exists the possibility that the socket stays open and is no longer accessible. The timeout facility is reset each time a valid Modbus message is received and the socket stays open. If there is no activity then the socket will timeout and send a message to the Modbus master indicating that the socket is closing.
- **Input Type:** The type for the module can be configured by entering the corresponding number from the list in the specifications.



- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

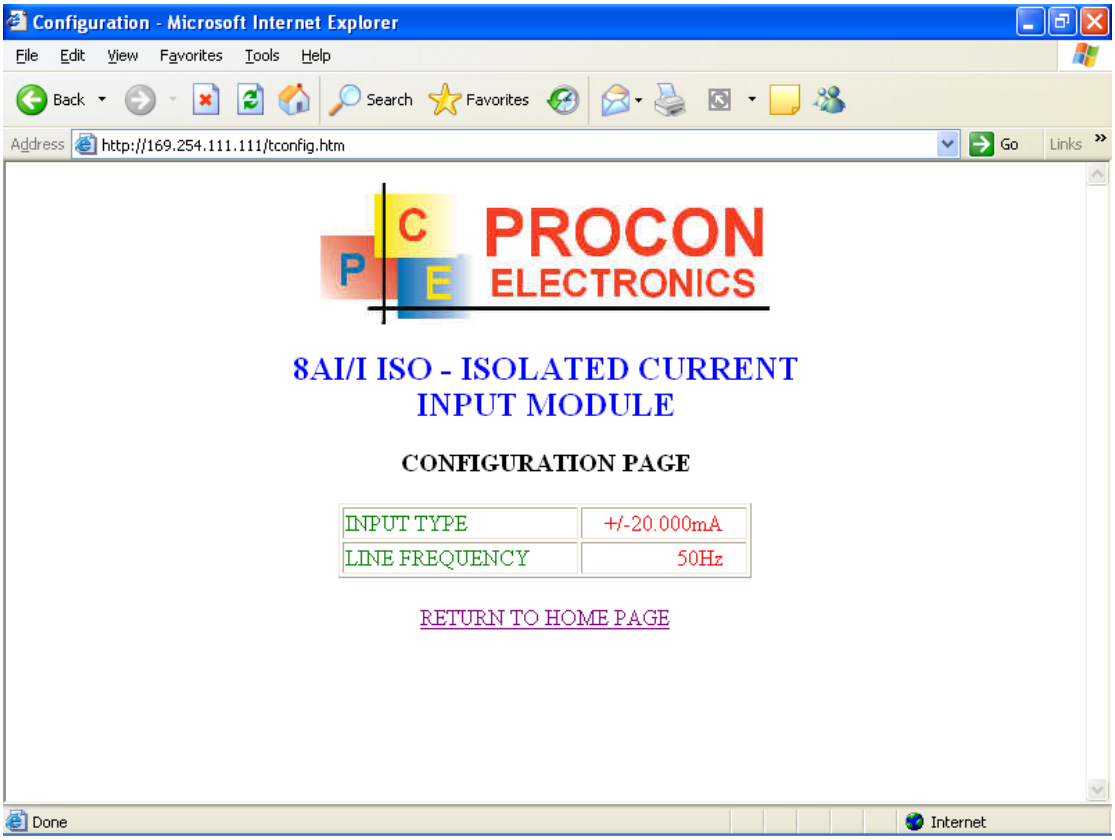
4.6.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Channel Number:** This refers to the actual input number on the terminals of the module.
- **Channel Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **Value:** This is the current value of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Configuration Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/tconfig.htm**" into the address line of the browser window.



- **Input Type:** This is the format that the module has been configured to operate with.
- **Line Frequency:** Depending on the mains frequency this can be either 50 or 60 Hz

4.7 MMTCP8AI/V ISO - ISOLATED VOLTAGE INPUTS

4.7.1 DESCRIPTION

The MMTCP8AI/V ISO module is a 8 channel isolated voltage input module. The module uses differential inputs to reduce effects of electrical noise and mains pickup. The voltage inputs are isolated from the logic and from each other.

The voltage input can be represented in a number of formats according to the type which is setup by writing a value to the Type register. The value is obtained from the table below.

The standard setting for the MMTCP8AI/V ISO module is 0 – 10V input voltage which represents an output value of 0 - 4095 (12 bits) in the corresponding Modbus register. 2V would give a reading of 819 ± 1LSB.

The module can also be configured for a 0 – 10.000V input range or +/- 10.000V input.

Each MMTCP8AI/V ISO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8AI/V ISO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm. The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.7.2 SPECIFICATIONS

Power Supply: Logic 10 - 26Vdc 90 mA @ 24VDC / 160mA @ 12VDC

Inputs:

Input Type	Range	Resolution
1	0 – 4095	(12 bits)
2	0 – 10.000 V	1mV
3	+/- 10.000 V	1mV
4	0 – 1.0000 V	0.1mV
5	+/- 1.0000 V	0.1mV

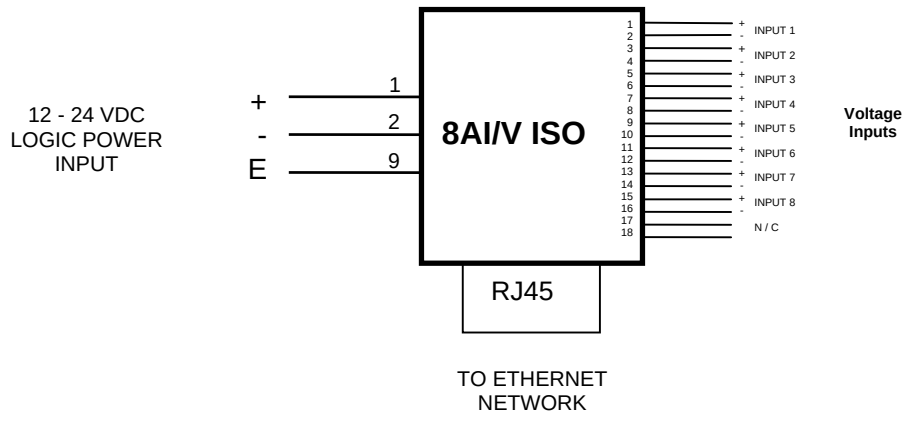
Drift 100ppm/°C Typ.

Isolation 1000Vrms between field and logic
350Vpeak between each current input

Ethernet: 10BaseT - 10Mbits/s twisted pair

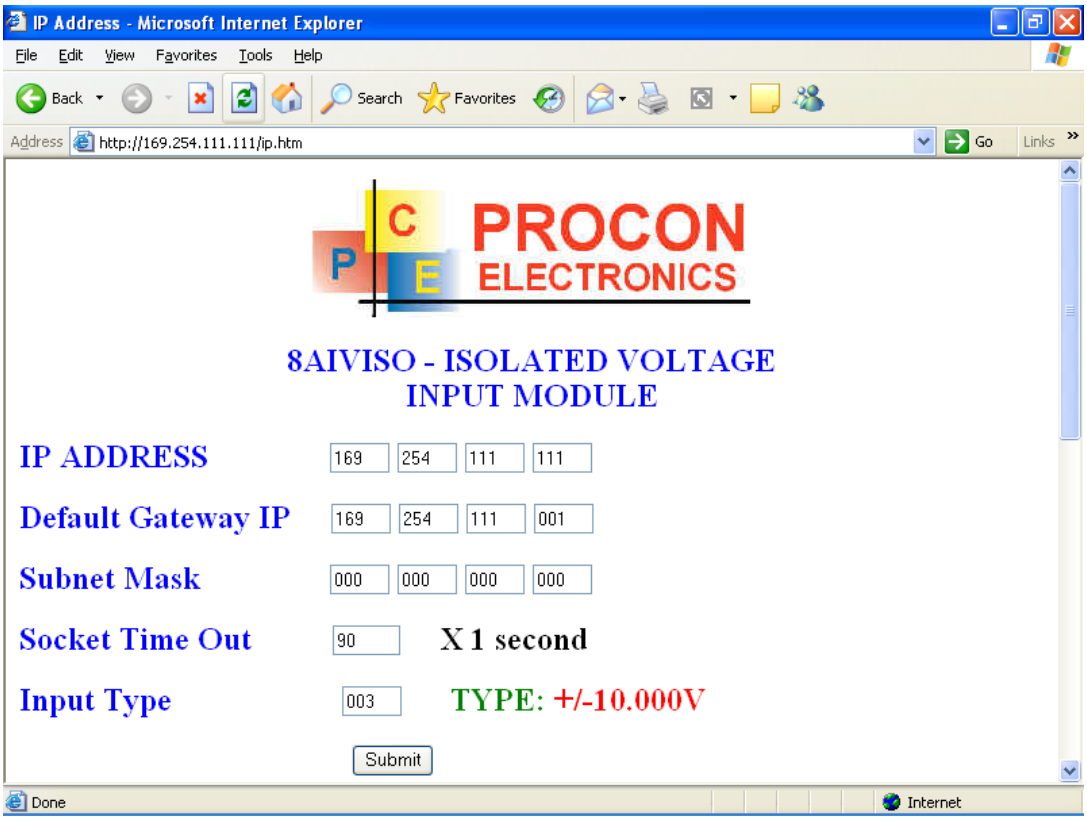
Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10Base-T Ethernet

4.7.3 WIRING



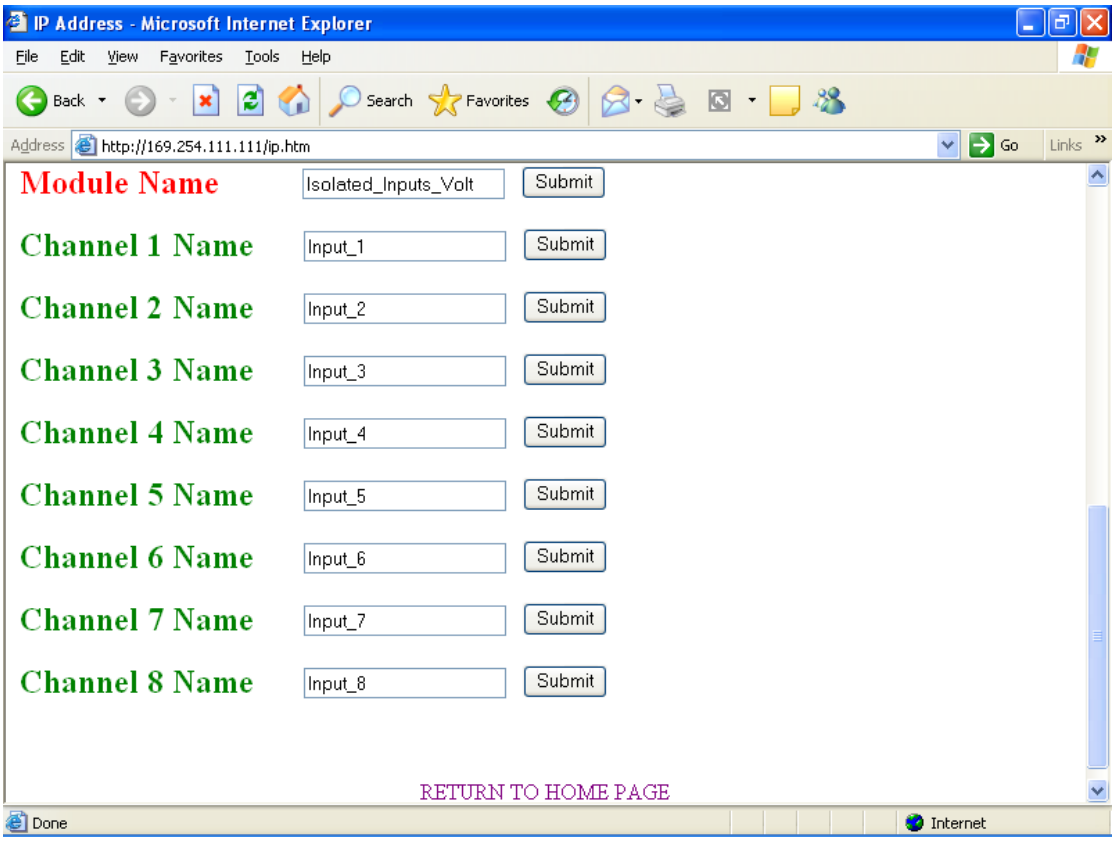
4.7.4 CONFIGURATION

The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address, default gateway and subnet mask of the MOD-MUX TCP Module, select the Input type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** If the MOD-MUX TCP Module is on a different network to your PC you may need to setup the IP address of the gateway.
- **Subnet Mask:** The subnet mask must also be entered if the default gateway setting is used. A subnet mask of 000.000.000.000 will disable the default gateway setting.
- **Socket Timeout:** The MOD-MUX TCP Module communicates using sockets which are part of the TCP/IP protocol. The module has 5 sockets. If a communication link is lost with the Modbus master, then there exists the possibility that the socket stays open and is no longer accessible. The timeout facility is reset each time a valid Modbus message is received and the socket stays open. If there is no activity then the socket will timeout and send a message to the Modbus master indicating that the socket is closing.

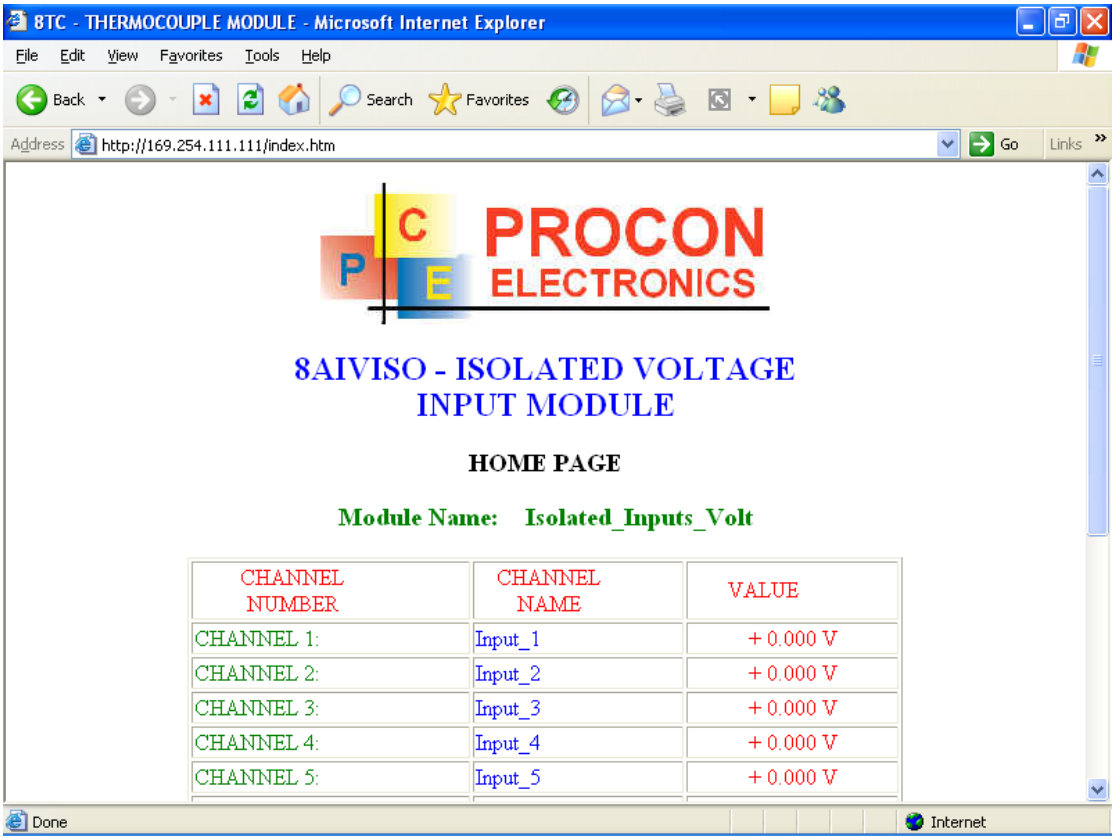
- **Input Type:** The type for the module can be configured by entering the corresponding number from the list in the specifications.



- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

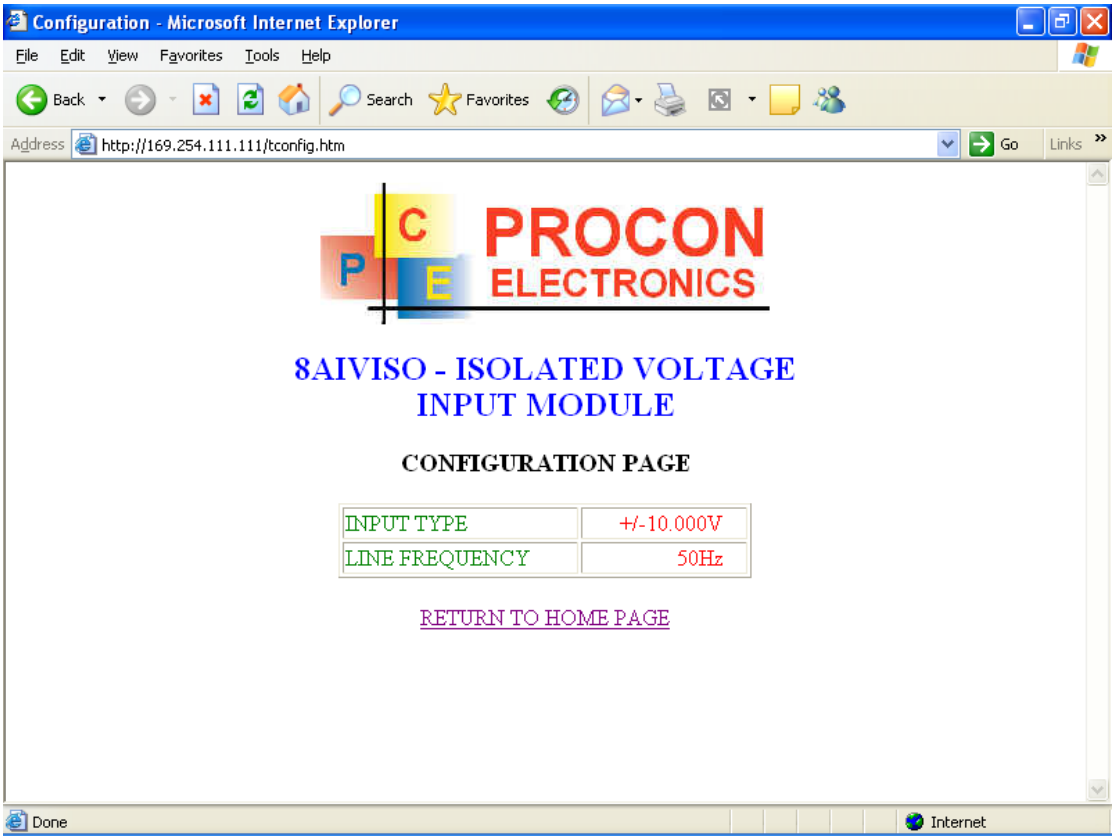
4.7.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Channel Number:** This refers to the actual input number on the terminals of the module.
- **Channel Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **Value:** This is the current value of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Configuration Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/tconfig.htm**" into the address line of the browser window.



- **Input Type:** This is the format that the module has been configured to operate with.
- **Line Frequency:** Depending on the mains frequency this can be either 50 or 60 Hz

4.8 MMTCP8TC - THERMOCOUPLE INPUTS

4.8.1 DESCRIPTION

The MMTCP8TC module is a 8 thermocouple input module. The module uses differential inputs to reduce effects of electrical noise and mains pickup. The thermocouple inputs are isolated from the logic. If inter channel isolation is required then the MMTCP8TCISO should be used.

The thermocouple voltage is read by the module circuitry, linearised and converted to degrees Centigrade. No ranging is required as the module covers the full temperature range of the thermocouple. The value that is read from the Modbus register is the actual temperature in degrees centigrade to 0.1°C resolution. ie: a value of 3451 corresponds to a temperature of 345.1°C.

The thermocouple type is setup by writing a value to the TC Type register. The value is obtained from the table below. For example to select type K thermocouples, the value "2" must be written to the TC Type register. All 8 thermocouple inputs adopt the same TC type.

A value of -32767 is used to indicate downscale burnout.

The module has built in Cold Junction Compensation. Use must be made of the correct thermocouple extension wire to avoid reading errors.

The thermocouple module can also be configured for a 0 - 50mV input range. The TC Type register must be set to 9 for this option. The value in the register which is read back over the network is 0 - 50,000.

Note: As there is no inter-channel isolation, isolated thermocouples must be used in order to prevent ground loops and reading errors.

Each MMTCP8TC Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8TC Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the Thermocouple input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.8.2 SPECIFICATIONS

Power Supply: Logic 10 - 26Vdc @ 140 mA

Inputs:

TC Type	Range	Accuracy
1 - J	-150 to 760 °C	0.2°C
2 - K	-200 to 1370 °C	0.3°C
3 - E	0 to 600 °C	0.1°C
4 - T	-200 to 400 °C	0.3°C
5 - N	0 to 1300 °C	0.3°C
6 - B	400 to 1820 °C	0.5°C
7 - S	-50 to 1767 °C	0.6°C
8 - R	-50 to 1767 °C	0.7°C
9 - mV	0 to 50mV	0.1%
10 - C	0 to 2315.5 °C	0.7°C
11 - D	0 to 2315.5 °C	0.7°C
12 - G	0 to 2315.5 °C	0.9°C

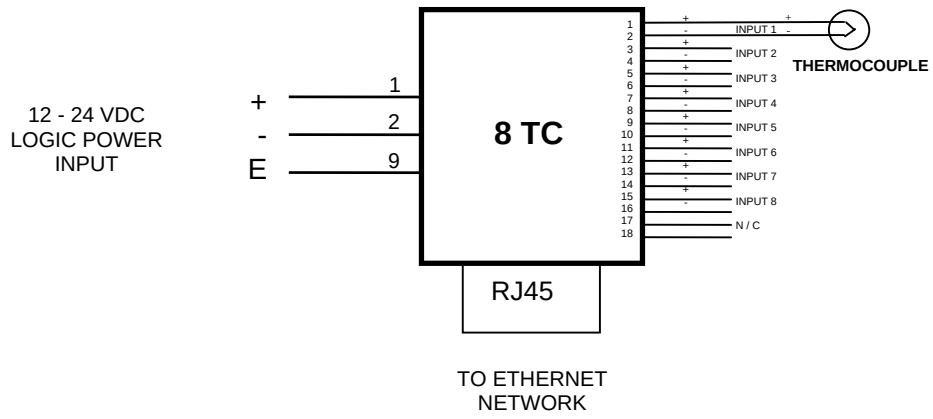
Resolution 0.1°C
Drift 100ppm/°C Typ.
Isolation 1000Vrms between field and logic

CJC error: ±1.0°C Typ. After 30 Minutes warm up time.

Ethernet: 10BaseT - 10Mbits/s twisted pair

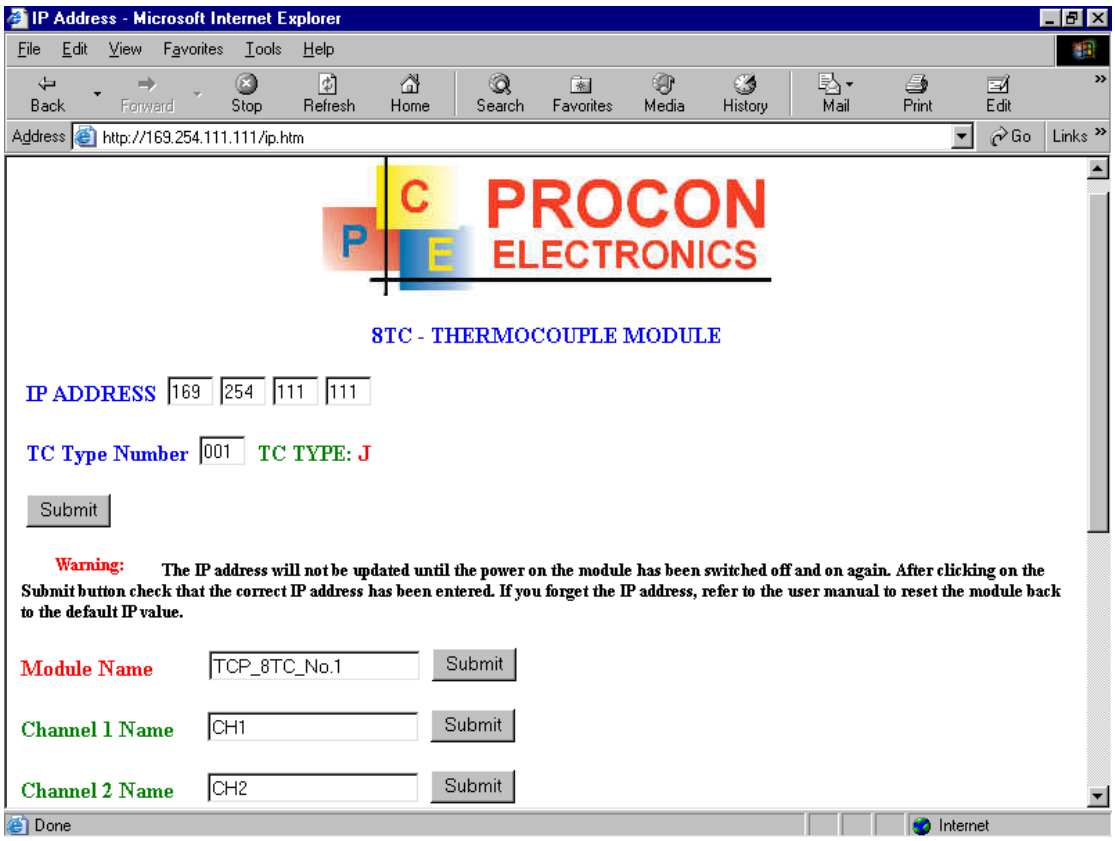
Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10Base-T Ethernet

4.8.3 WIRING



4.8.4 CONFIGURATION

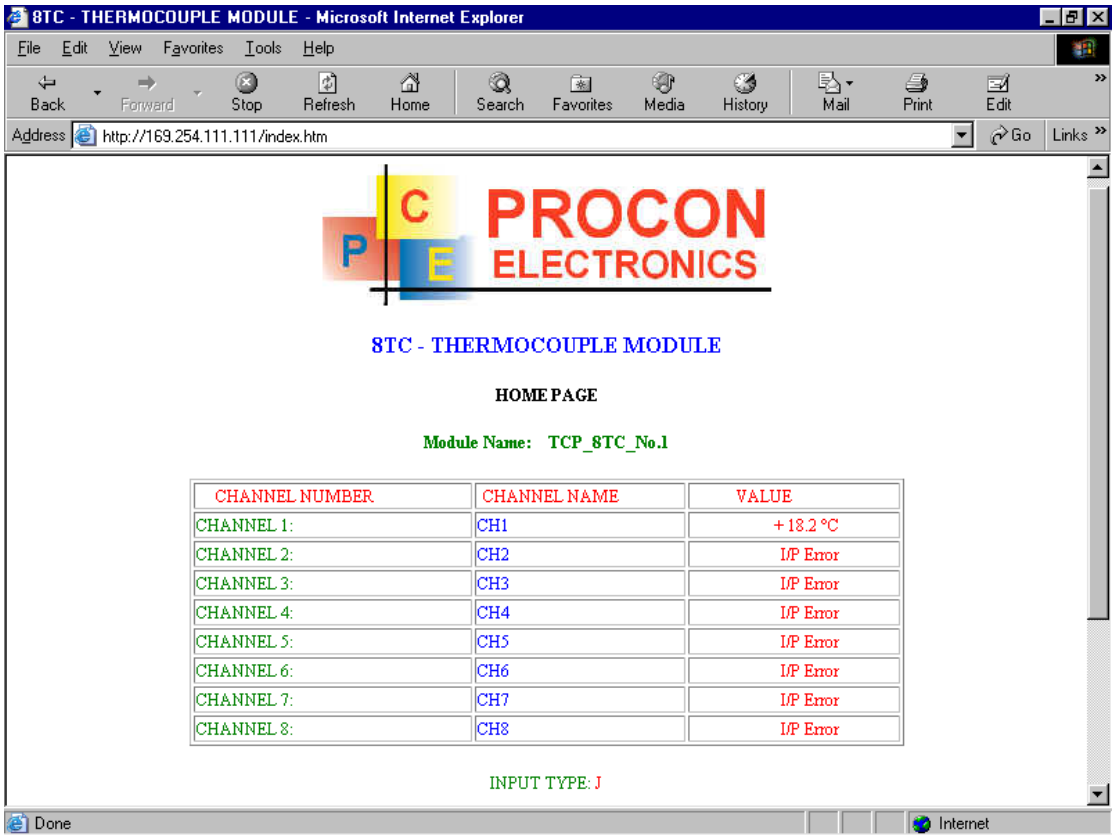
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module, select the TC type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **TC Type:** The thermocouple type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

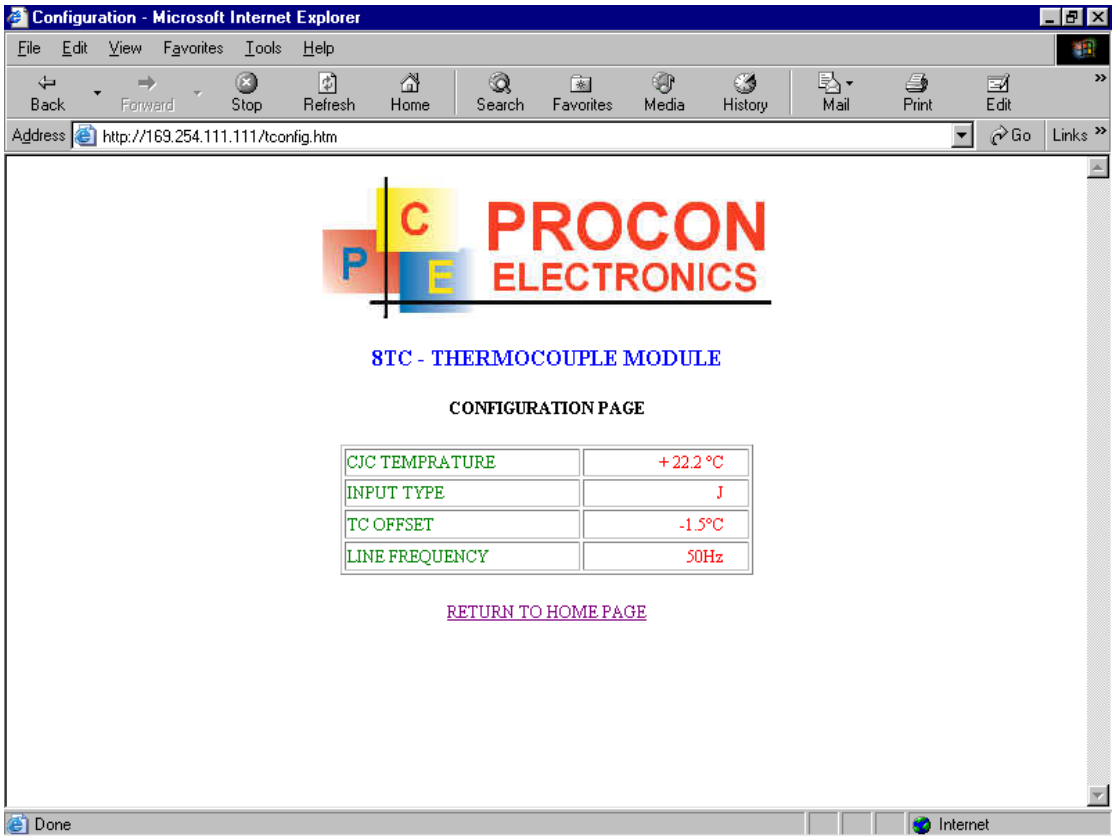
4.8.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Channel Number:** This refers to the actual input number on the terminals of the module.
- **Channel Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **Value:** This is the current temperature of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Configuration Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/tconfig.htm**" into the address line of the browser window.



- **CJC Temperature:** This is the temperature of the terminals inside the module.
- **Input Type:** This is the type of thermocouple the module has been configured to operate with.
- **TC OFFSET:** This is a correction factor
- **Line Frequency:** Depending on the mains frequency this can be either 50 or 60 Hz

4.9 MMTCP8TCISO - ISOLATED THERMOCOUPLE INPUTS

4.9.1 DESCRIPTION

The MMTCP8TCISO module is a 8 isolated thermocouple input module. The module uses differential inputs to reduce effects of electrical noise and mains pickup. The thermocouple inputs are isolated from the logic and from each other. This module is operated in an identical way to the MMTCP8TC module and is fully interchangeable.

The thermocouple voltage is read by the module circuitry, linearised and converted to degrees Centigrade. No ranging is required as the module covers the full temperature range of the thermocouple. The value that is read from the Modbus register is the actual temperature in degrees centigrade to 0.1°C resolution. ie: a value of 3451 corresponds to a temperature of 345.1°C.

The thermocouple type is setup by writing a value to the TC Type register. The value is obtained from the table below. For example to select type K thermocouples, the value "2" must be written to the TC Type register. All 8 thermocouple inputs adopt the same TC type.

A value of -32767 is used to indicate downscale burnout.

The module has built in Cold Junction Compensation. Use must be made of the correct thermocouple extension wire to avoid reading errors.

The thermocouple module can also be configured for a 0 - 50mV input range. The TC Type register must be set to 9 for this option. The value in the register which is read back over the network is 0 - 50,000.

Each MMTCP8TC Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8TC Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the Thermocouple input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.9.2 SPECIFICATIONS

Power Supply: Logic 10 - 26Vdc @ 140 mA

Inputs:

TC Type	Range	Accuracy
1 - J	-150 to 760 °C	0.2°C
2 - K	-200 to 1370 °C	0.3°C
3 - E	0 to 600 °C	0.1°C
4 - T	-200 to 400 °C	0.3°C
5 - N	0 to 1300 °C	0.3°C
6 - B	400 to 1820 °C	0.5°C
7 - S	-50 to 1767 °C	0.6°C
8 - R	-50 to 1767 °C	0.7°C
9 - mV	0 to 50mV	0.1%
10 - C	0 to 2315.5 °C	0.7°C
11 - D	0 to 2315.5 °C	0.7°C
12 - G	0 to 2315.5 °C	0.9°C

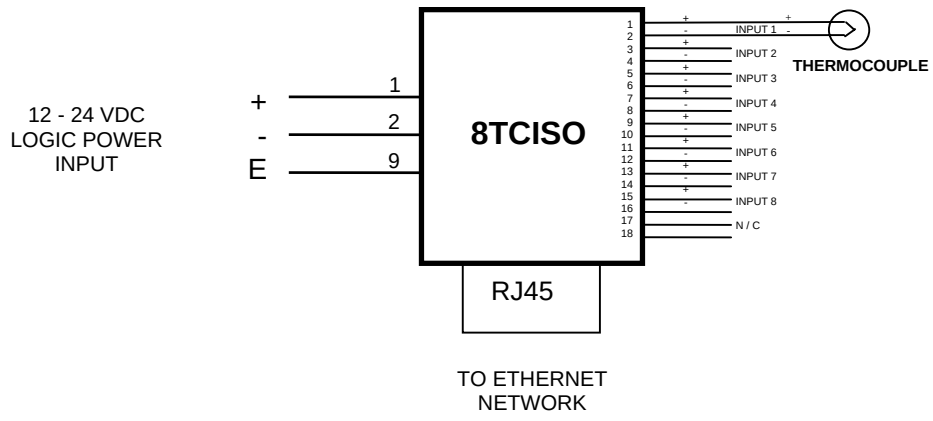
Resolution 0.1°C
Drift 100ppm/°C Typ.
Isolation 1000Vrms between field and logic
350Vpeak between each TC input

CJC error: ±1.0°C Typ. After 30 Minutes warm up time.

Ethernet: 10BaseT - 10Mbits/s twisted pair

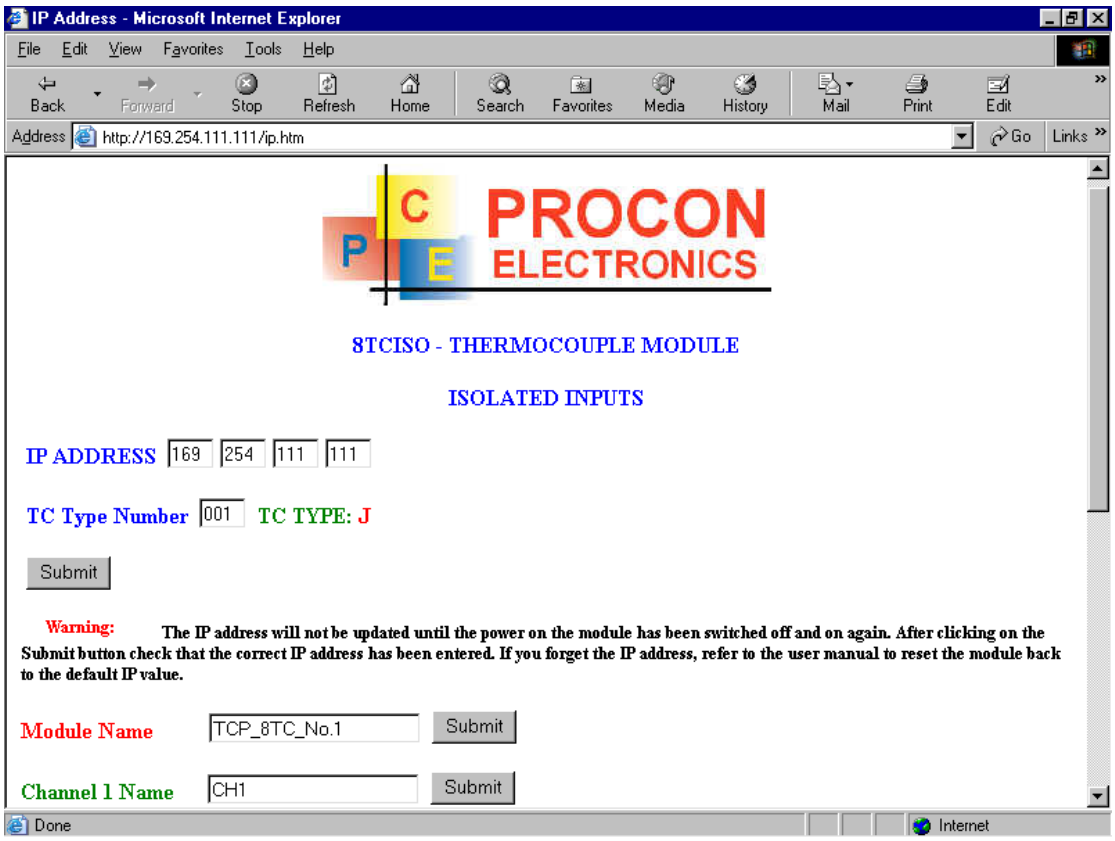
Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10Base-T Ethernet

4.9.3 WIRING



4.9.4 CONFIGURATION

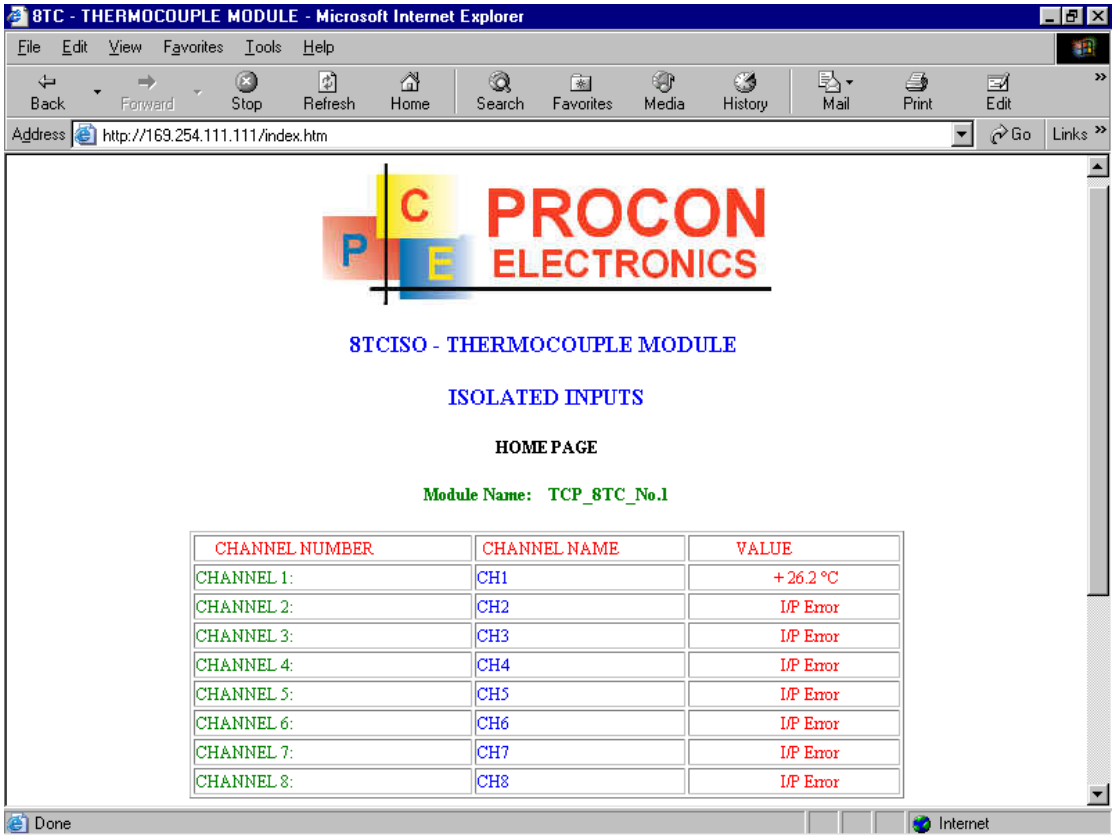
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module, select the TC type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **TC Type:** The thermocouple type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

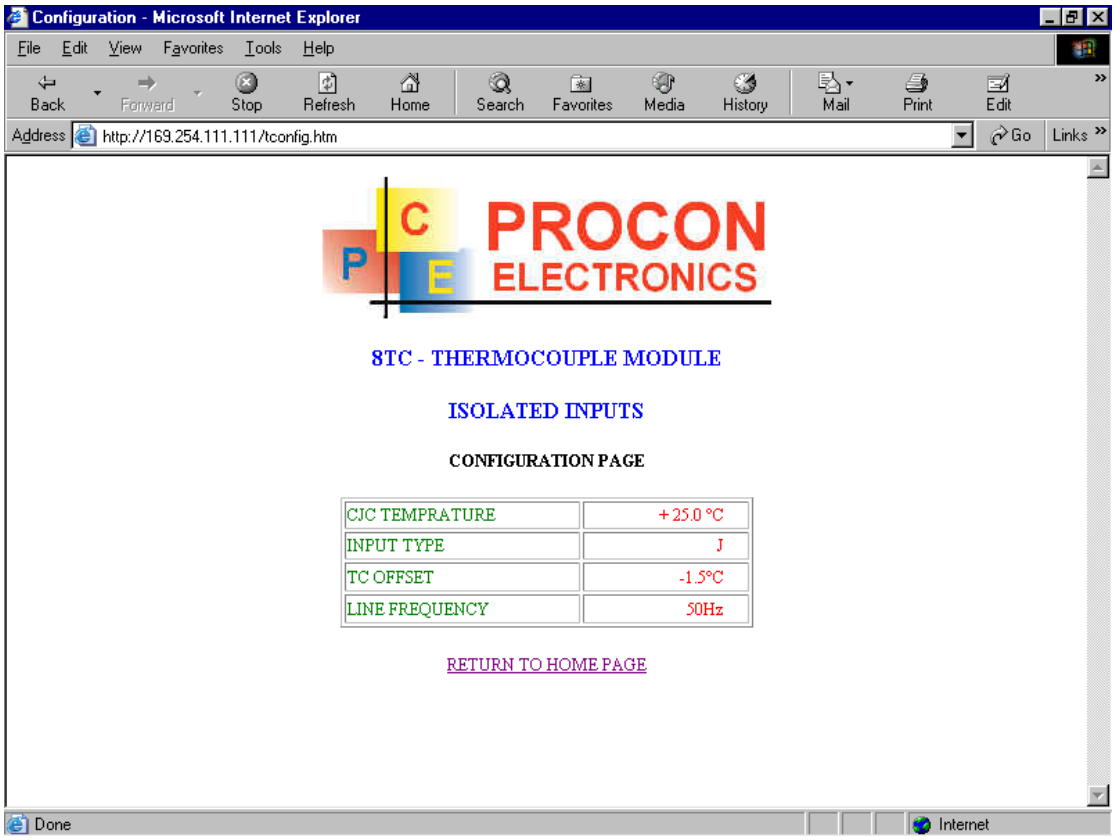
4.9.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Channel Number:** This refers to the actual input number on the terminals of the module.
- **Channel Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **Value:** This is the current temperature of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Configuration Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/tconfig.htm**" into the address line of the browser window.



- **CJC Temperature:** This is the temperature of the terminals inside the module.
- **Input Type:** This is the type of thermocouple the module has been configured to operate with.
- **TC OFFSET:** This is a correction factor
- **Line Frequency:** Depending on the mains frequency this can be either 50 or 60 Hz

4.10 MMTCP6RTD - RTD INPUTS

4.10.1 DESCRIPTION

The MMTCP6RTD module is a 6 RTD input module. The module can accommodate either 2 or 3 wire RTD sensors. The RTD inputs are isolated from the logic.

The RTD resistance is read by the module circuitry, linearised and converted to degrees Centigrade. No ranging is required as the module covers the full range of the RTD. The value that is read from the Modbus register is the actual temperature in degrees centigrade to 0.1°C resolution. ie: a value of 3451 corresponds to a temperature of 345.1°C.

The RTD type is setup by writing a value to the RTD Type register . The value is obtained from the table below. For example to select a PT100 RTD, the value "1" must be written to the RTD Type register. All 6 RTD inputs adopt the same RTD type.

A value of -32767 is used to indicate downscale burnout.

Note: As there is no inter-channel isolation, isolated RTD's must be used in order to prevent ground loops and reading errors.

Each MMTCP6RTD Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP6RTD Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the RTD input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.10.2 SPECIFICATIONS

Power Supply: Logic 10 - 26Vdc @ 140 mA

Inputs: 2 or 3 Wire

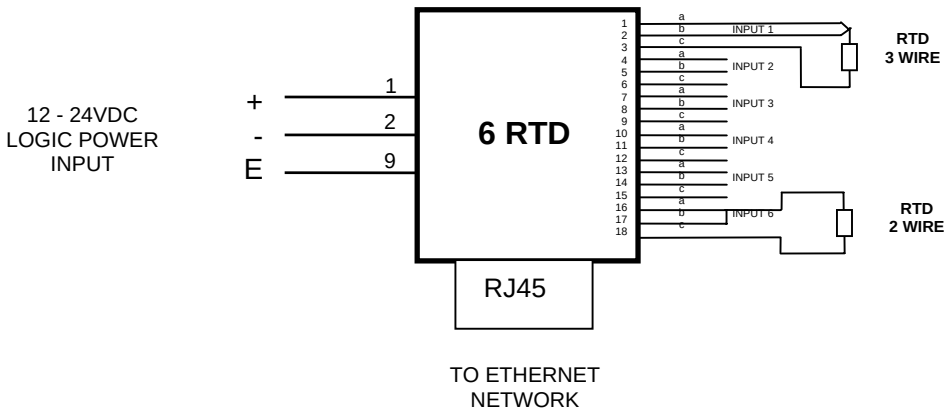
RTD Type	Range	Accuracy	Standard
1 - PT100	-200 to 850 °C	0.3°C	IEC 751:1983
2 - Ni120	-80 to 320 °C	0.3°C	

Resolution	0.1°C
Drift	100ppm/°C Typ.
Line resistance effect	< 0.1°C balanced
Max. line resistance	100ohms
Isolation	1000Vrms between field and logic

Ethernet: 10BaseT - 10Mbits/s twisted pair

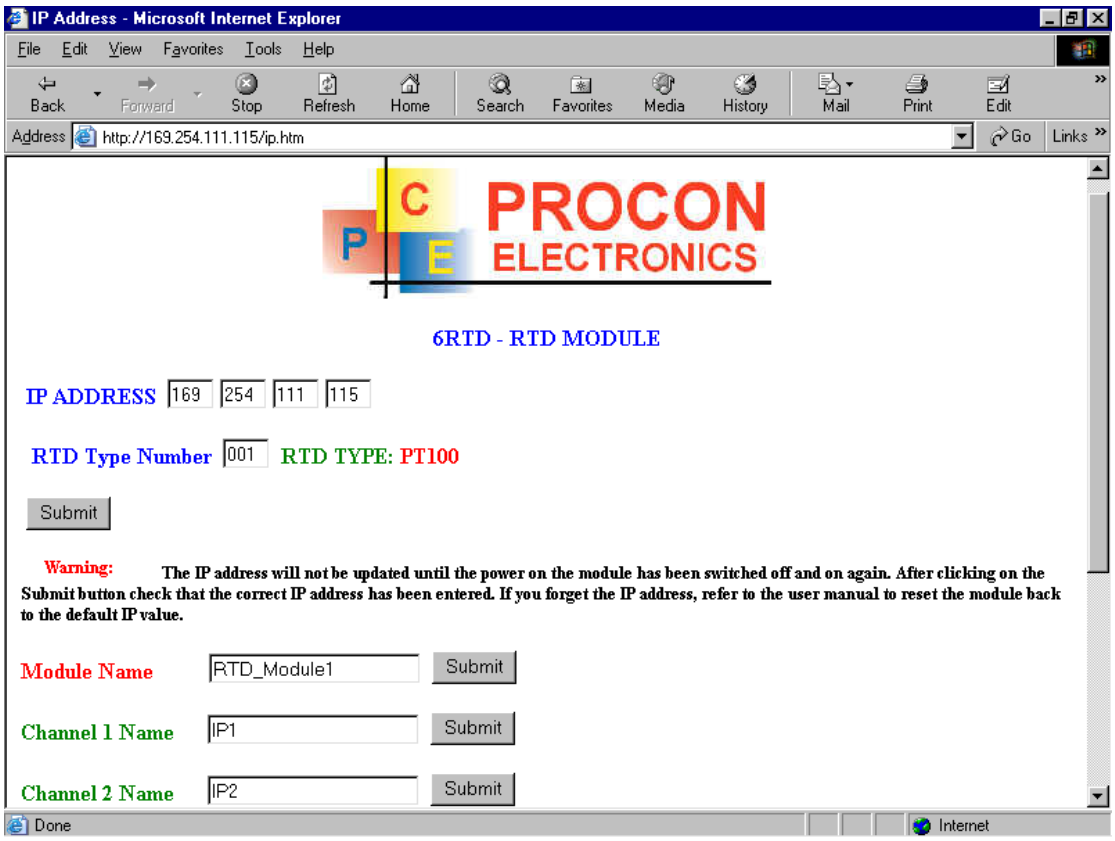
Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10BaseT Ethernet

4.10.3 WIRING



4.10.4 CONFIGURATION

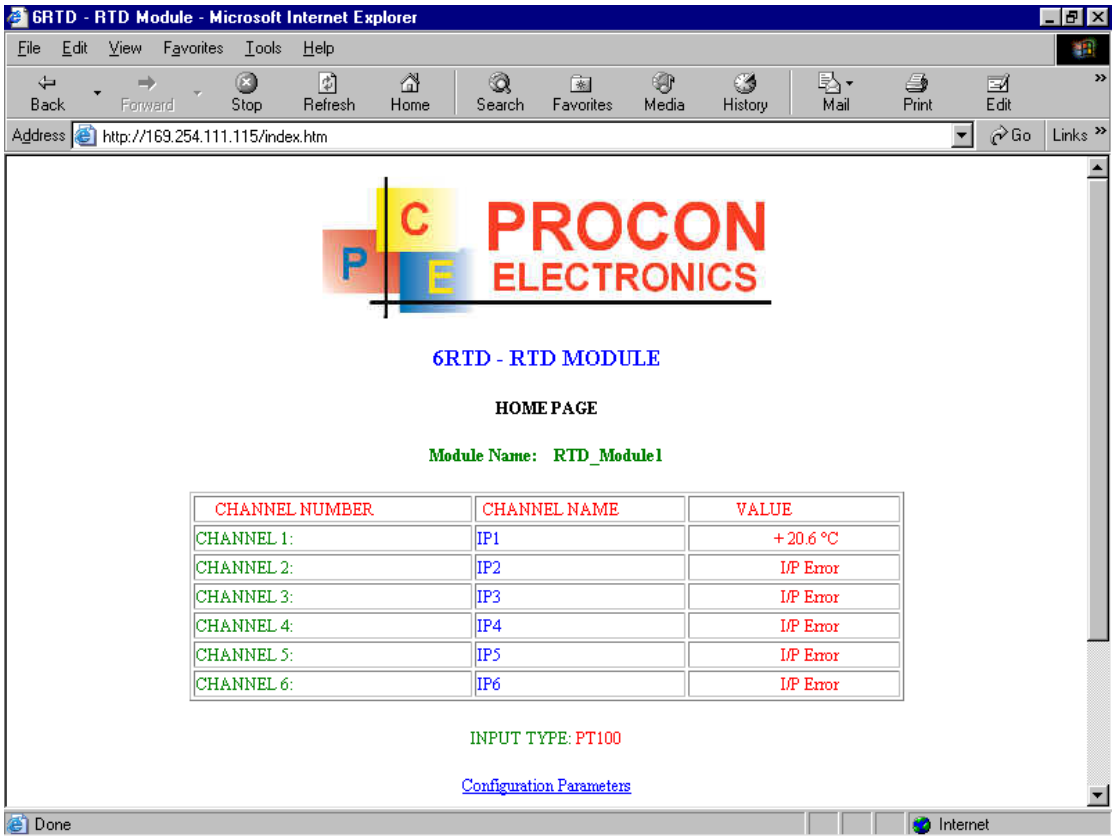
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module, select the RTD type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **RTD Type:** The RTD type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

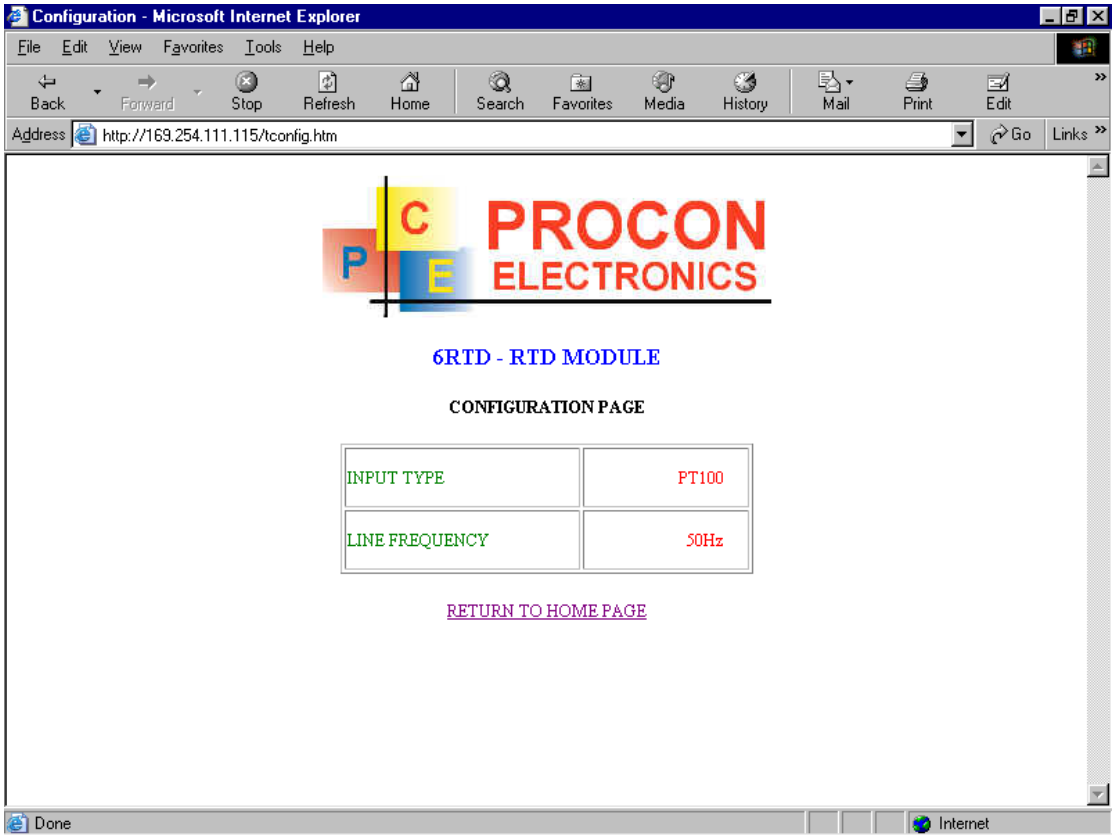
4.10.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Channel Number:** This refers to the actual input number on the terminals of the module.
- **Channel Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **Value:** This is the current temperature of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Configuration Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/tconfig.htm**" into the address line of the browser window.



- **Input Type:** This is the type of RTD the module has been configured to operate with.
- **Line Frequency:** Depending on the mains frequency this can be either 50 or 60 Hz

4.11 MMTCPDIOAIO – DIGITAL + ANALOG INPUTS/OUTPUTS

4.11.1 DESCRIPTION

The MMTCPDIOAIO module is a multipurpose combination of inputs and outputs. The module can accommodate either 2 or 3 wire RTD sensors, current (0-20mA) and voltage (0-10V) inputs, current (0-20mA) or voltage (0-10V) output, and digital inputs and outputs.

RTD INPUTS:
There are 2 RTD inputs on the module. The RTD resistance is read by the module circuitry, linearised and converted to degrees Centigrade. No ranging is required as the module covers the full range of the RTD as indicated in the RTD table. The value that is read from the Modbus register is the actual temperature in degrees centigrade to 0.1°C resolution. ie: a value of 3451 corresponds to a temperature of 345.1°C.

The RTD type is setup by writing a value to the RTD Type register. The value is obtained from the table below. For example to select a PT100 RTD, the value "1" must be written to the RTD Type register.

A value of -32767 is used to indicate downscale burnout.

Note: As there is no inter-channel isolation, isolated RTD's must be used in order to prevent ground loops and reading errors.

ANALOG INPUTS:

The Analog Inputs (2) can be configured by internal jumpers as either a current input (0-20mA) or a voltage input (0-10V).

An input of 0 - 20mA input current or 0 – 10V input voltage represents an output value of 0 - 4095 (12 bits) in the corresponding Modbus register.

ANALOG OUTPUT:

There is a single analog output which can be configured with internal jumpers for a current output (0-20mA) or voltage output (0-10V).

The resolution is 12 bits, so writing a value to the Modbus register for each output of 0 - 4095 would give an output current of 0 - 20mA. A value of 819 ± 1LSB will give a current output of 4mA.

DIGITAL INPUTS:

There are 5 digital inputs on the module. The inputs have internal pull-up resistors and are switched to negative.

The first 2 inputs have got counters associated with them. The counters operate in three modes.

In **mode 0** all the counters are disabled.

In **mode 1** all counters are 32 bit counters allowing a count value from 0 to 4294967295. The count value can be cleared by writing a zero to the associated registers or preset to any other value using the same method.

In **mode 2** the inputs are connected as up/down counters. Input 1 will increment counter 1 whilst input 2 decrements counter1.

Note: The count values are not battery backed-up and will be lost if power is turned off.

The format of the registers allows the status of the inputs to be read as either single bits or all at once as a single register on the Modbus network.

DIGITAL OUTPUTS:

The module has 2 open collector (NPN) digital outputs. The outputs may be used to drive lamps or external relays when more drive capability is required.

The outputs are written to by the Modbus master device such as a PC or PLC. Each output can be individually switched on or off, or all outputs can be set up at the same time by writing a single number to the output register which represents the status of all outputs.

An output watchdog timer can be configured to switch off all the outputs if there has been no communications with the module for up to 255 seconds. A value of 0 seconds will disable this timer and the outputs will remain in the last programmed state.

Each MMTCPDIOAIO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCPDIOAIO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the input/output status parameters is http://169.254.111.111/index.htm and the address for viewing the configuration is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.11.2 SPECIFICATIONS

Power Supply: Logic	10 - 26 Vdc @	140 mA
Field	10 - 26 Vdc @	40 mA

RTD Inputs: 2 or 3 Wire

RTD Type	Range	Accuracy	Standard
1 - PT100	-200 to 850 °C	0.3°C	IEC 751:1983
2 - Ni120	-80 to 320 °C	0.3°C	

Resolution	0.1°C
Drift	100ppm/°C Typ.
Line resistance effect	< 0.1°C balanced
Max. line resistance	100ohms
Isolation	1000Vrms between field and logic

Analog Inputs:

Voltage	0(2) - 10 Vdc
Current	0(4) - 20 mA
Input Resistance (Volts)	190kohms
Input Resistance (Current)	250ohms
Resolution	12 bits
Drift	100ppm/°C
Accuracy	0.2% of span

Analog Outputs:

Current	0(4) - 20 mA
Resolution	12 bits
Drift	100ppm/°C typ.
Accuracy	0.05% of span
Compliance	1000 ohms max. @ 24Vdc 500 ohms max. @ 12Vdc
Voltage	0(2) - 10 V
Resolution	12 bits
Drift	100ppm/°C typ.
Accuracy	0.05% of span
Compliance	2000 ohms min. load

Digital Inputs:

Supply Voltage	10 - 26 Vdc (Internal) switch to negative
Input Current	2 mA @ 12Vdc / 4 mA @ 24Vdc

Counters:

Inputs	1 & 2
Resolution	32 Bits
Frequency	50 Hz (Max)
Pulse Width	20 ms (min)

Digital Outputs: Open Collector NPN

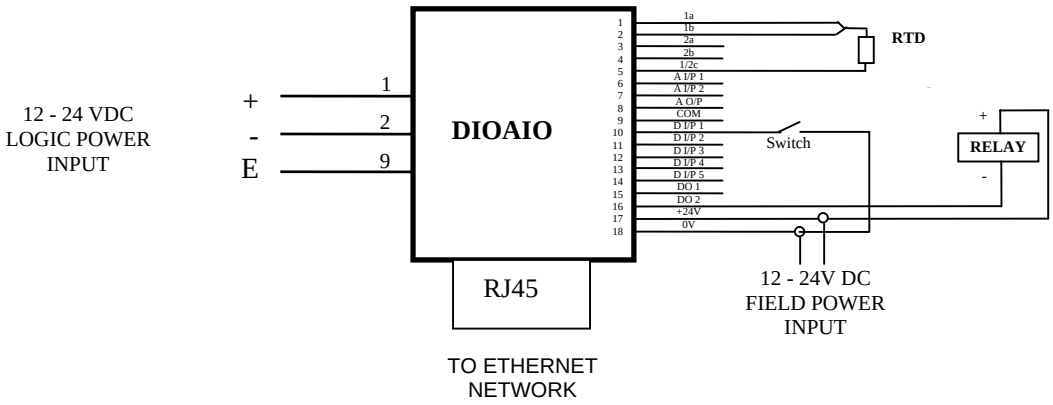
Maximum Voltage	36 Vdc
Maximum Current	100 mA
Vceon	1.1V Max.

Ethernet: 10BaseT - 10Mbits/s twisted pair

Connector: 11 Pin Connector on rear of unit
18 Way screw connector on front
RJ45 on front of module for 10Base-T Ethernet

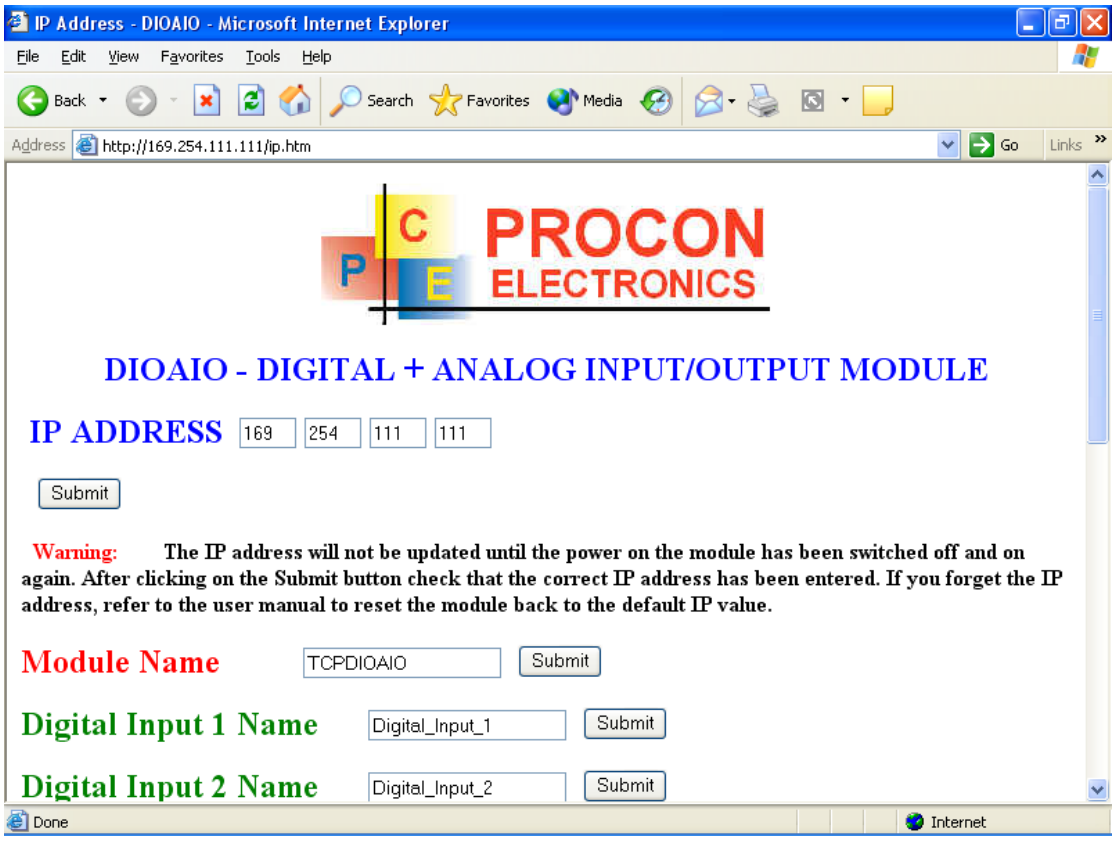
Note: Inputs 1 & 2 are used as both digital inputs and counter inputs.

4.11.3 WIRING



4.11.4 CONFIGURATION

The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Input

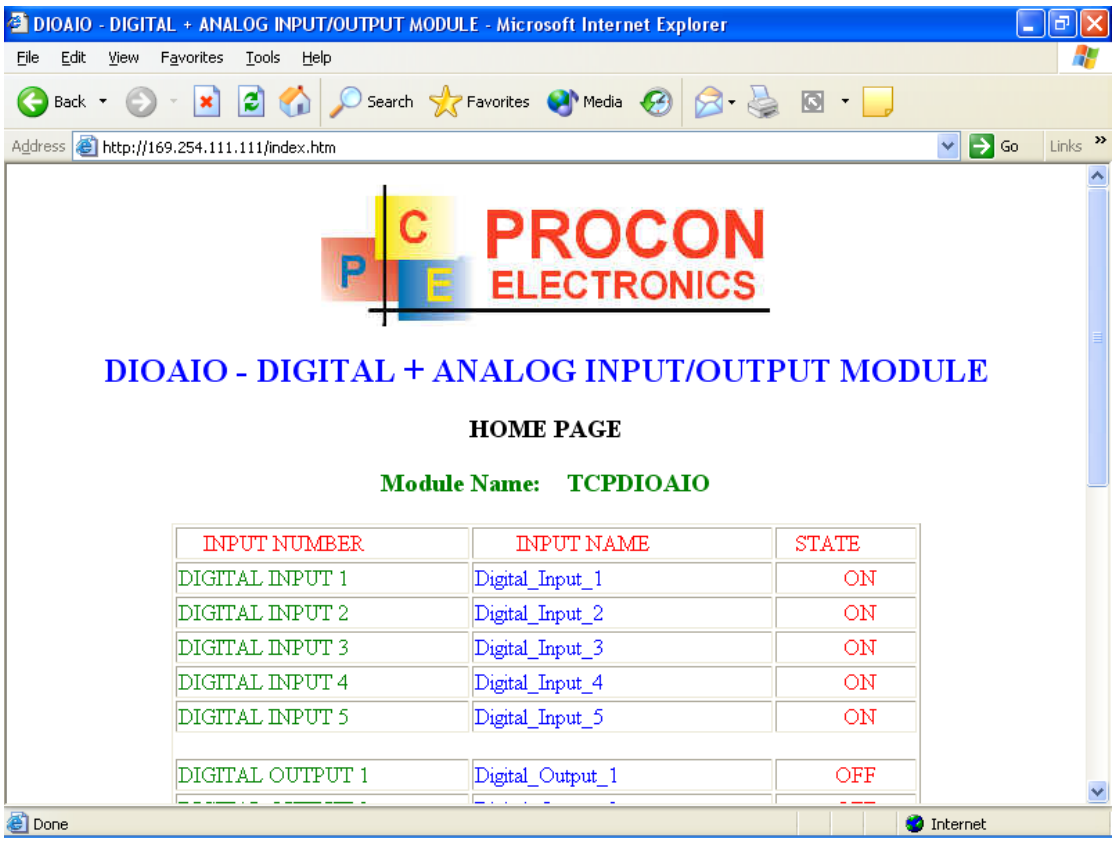


Names for identification/maintenance purposes.

- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Input/Output Names:** These fields allow you to enter an input description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input/output by name or number.

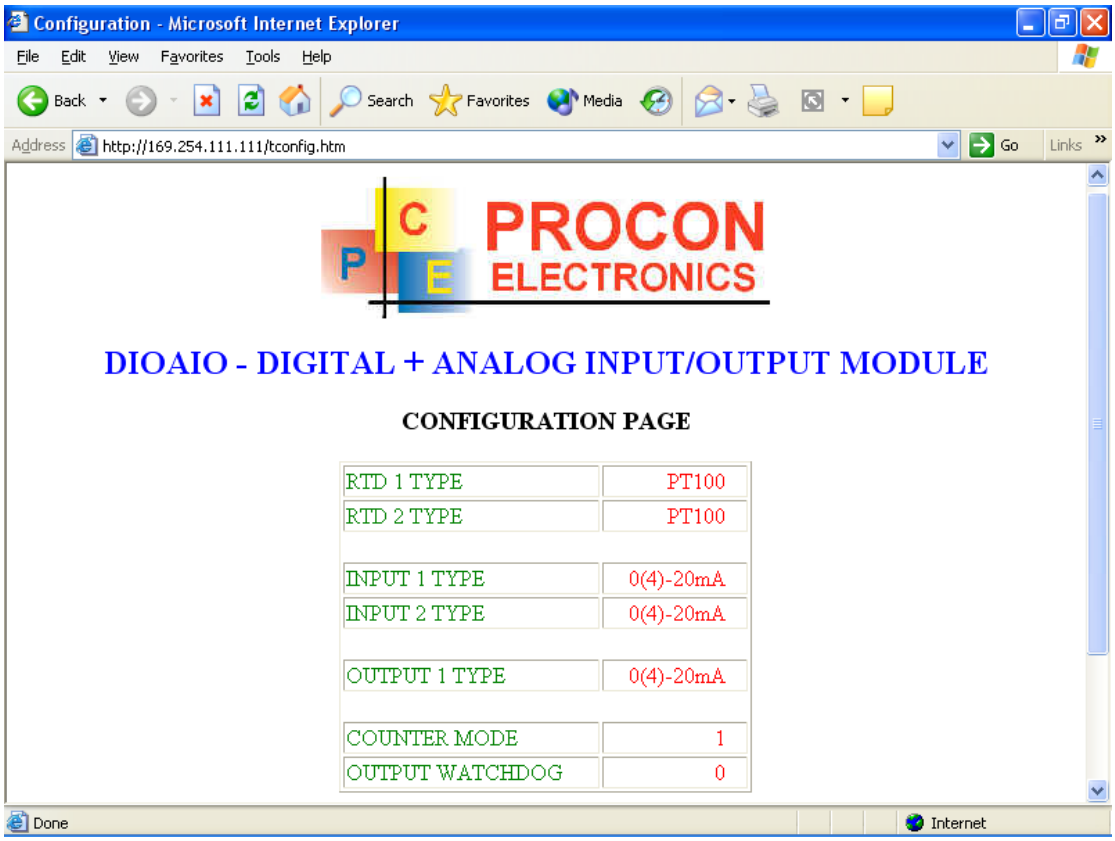
4.11.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Input Number:** This refers to the actual input number on the terminals of the module.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **State:** This is the current state of the inputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

To view the Configuration Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/tconfig.htm**" into the address line of the browser window.



- **RTD Type:** This is the type of RTD the module has been configured to operate with.
- **Input / Output Type:** This is the type of analog input or output: 1 = 0-20mA and 2 = 0-10V.
- **Counter Mode:** This determines the mode of the counter. Refer to the description above.
- **Output Watchdog:** This is the time that the outputs will keep their active state after communications has stopped. If the value is zero(0) then the outputs will not time out and the last state will remain as long as power is applied to the module.

4.12 MMTCP8AO - ANALOG OUTPUTS

4.12.1 DESCRIPTION

The MMTCP8AO Module is a 8 channel current output module. Each channel can be set to output a current in the range 0 - 20mA. The outputs are isolated from the logic and share a common negative terminal.

The resolution is 12 bits, so writing a value to the Modbus register for each output of 0 - 4095 would give an output current of 0 - 20mA. A value of 819 ± 1LSB will give a current output of 4mA.

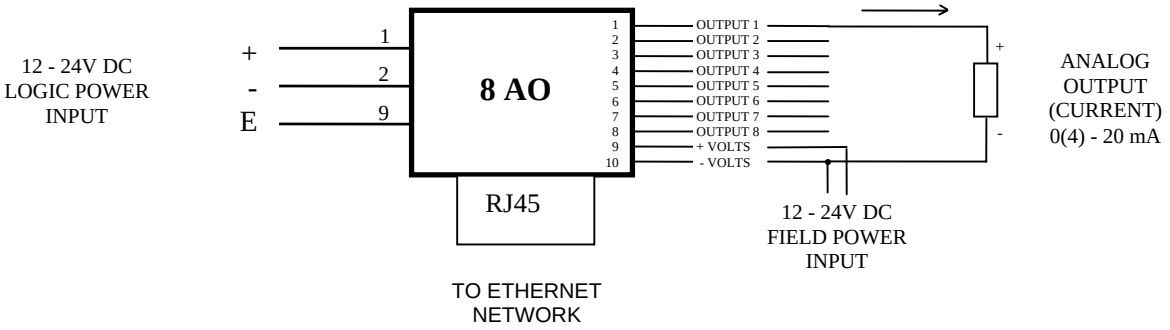
Each MMTCP8AO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8AO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the digital output status parameters is http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.12.2 SPECIFICATIONS

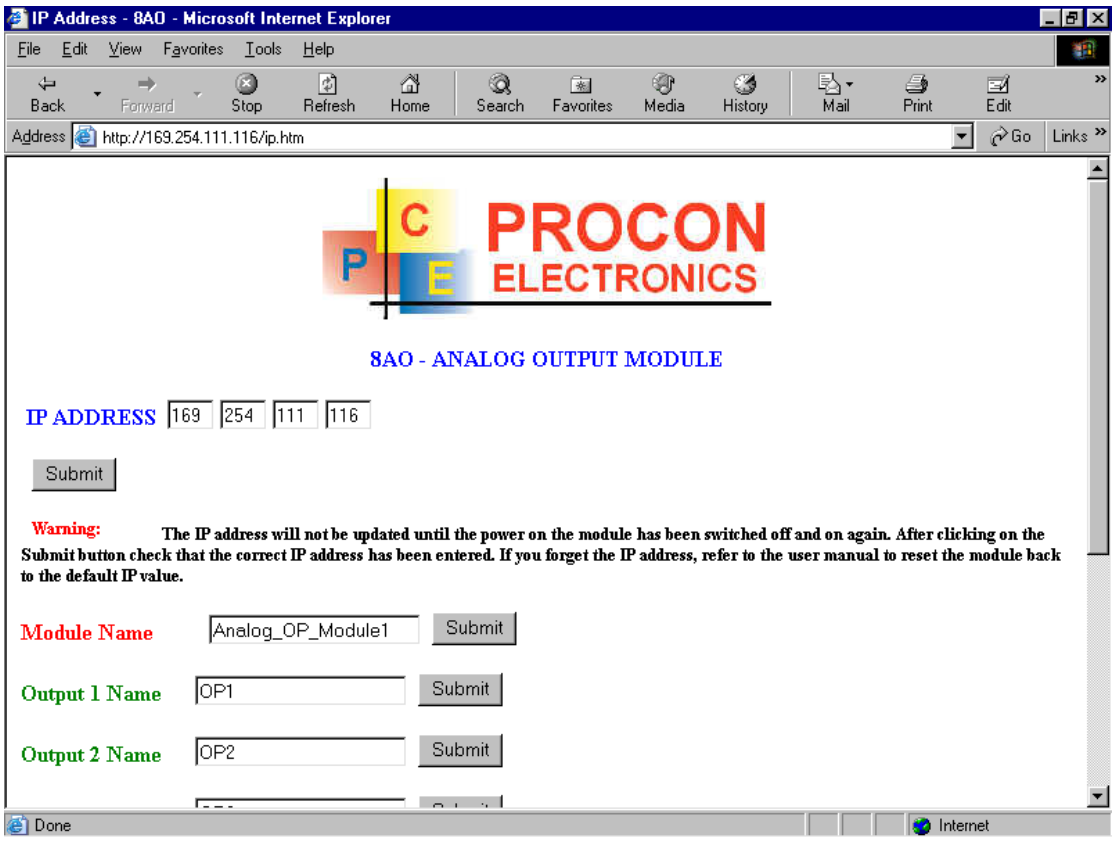
Power Supply: Logic	10 - 26 Vdc @	140 mA
Field	10 - 26 Vdc @	185 mA
Outputs:		
Current	0(4) - 20 mA	
Resolution	12 bits	
Isolation	1500Vrms between field and logic	
Drift	100ppm/°C typ.	
Accuracy	0.05% of span	
Compliance	1000 ohms max. @ 24Vdc 500 ohms max. @ 12Vdc	
Ethernet:	10BaseT - 10Mbits/s twisted pair	
Connector:	11 Pin Connector on rear of unit 10 Way screw connector on front RJ45 on front of module for 10BaseT Ethernet	

4.12.3 WIRING



4.12.4 CONFIGURATION

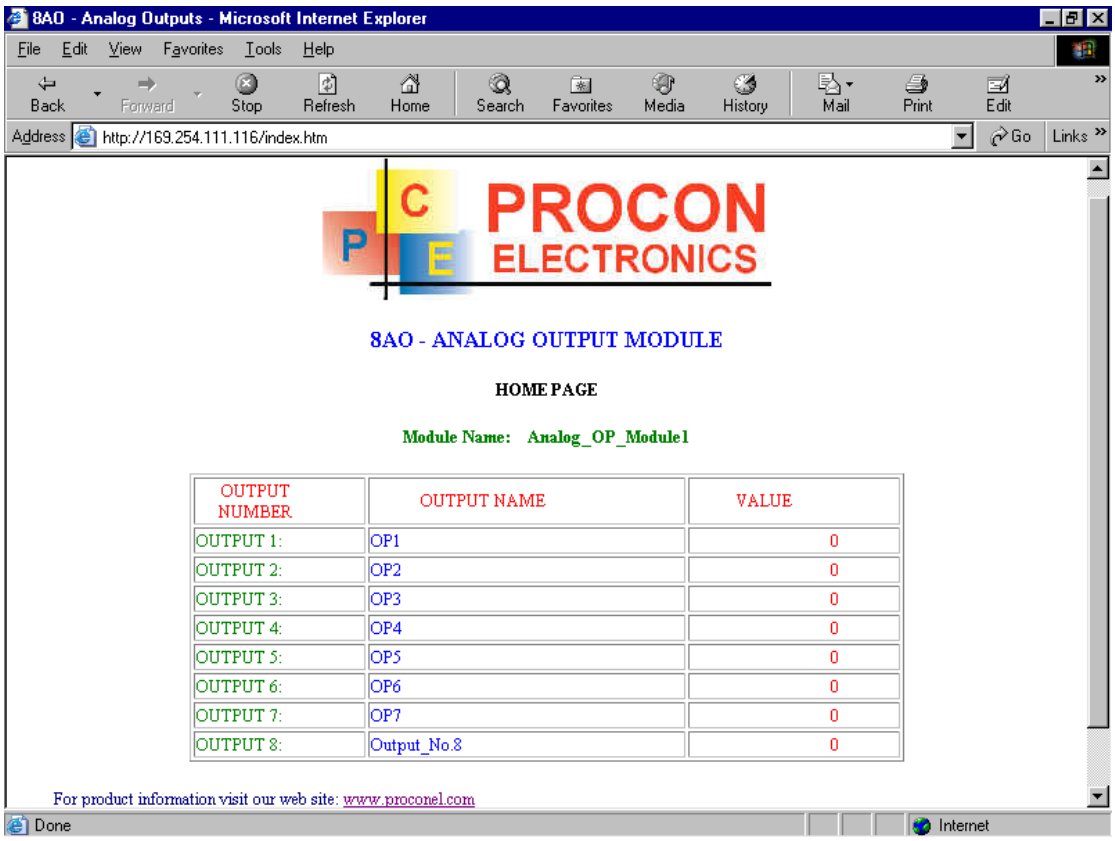
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Output Names:** These fields allow you to enter an output description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular output by name or number.

4.12.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/index.htm**" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Output Number:** This refers to the actual output number on the terminals of the module.
- **Output Name:** This is the name that was entered in the configuration page to best describe the outputs.
- **Value:** This is the current value of the outputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

4.13 MMTCP8VO - ANALOG OUTPUTS (VOLTS)

4.13.1 DESCRIPTION

The MMTCP8VO Module is a 8 channel voltage output module. Each channel can be set to output a voltage in the range 0 – 10V. The outputs are isolated from the logic and share a common negative terminal.

The resolution is 12 bits, so writing a value to the Modbus register for each output of 0 - 4095 would give an output current of 0 – 10V. A value of 819 ± 1LSB will give a current output of 2V.

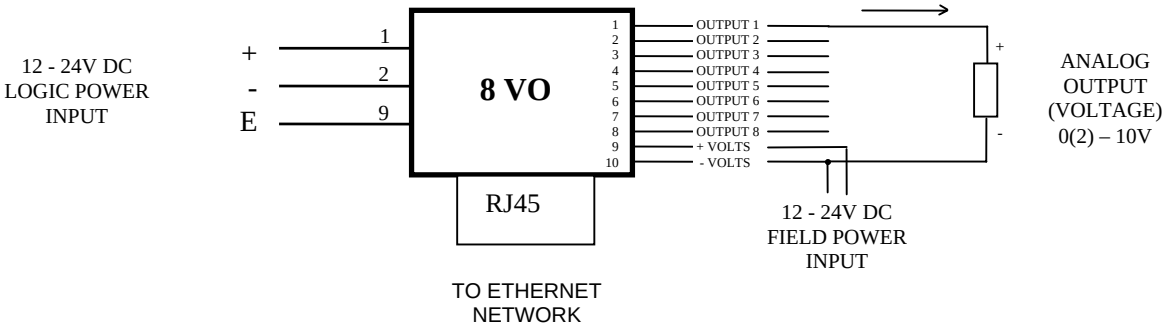
Each MMTCP8VO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the MMTCP8VO Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the digital output status parameters is http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.13.2 SPECIFICATIONS

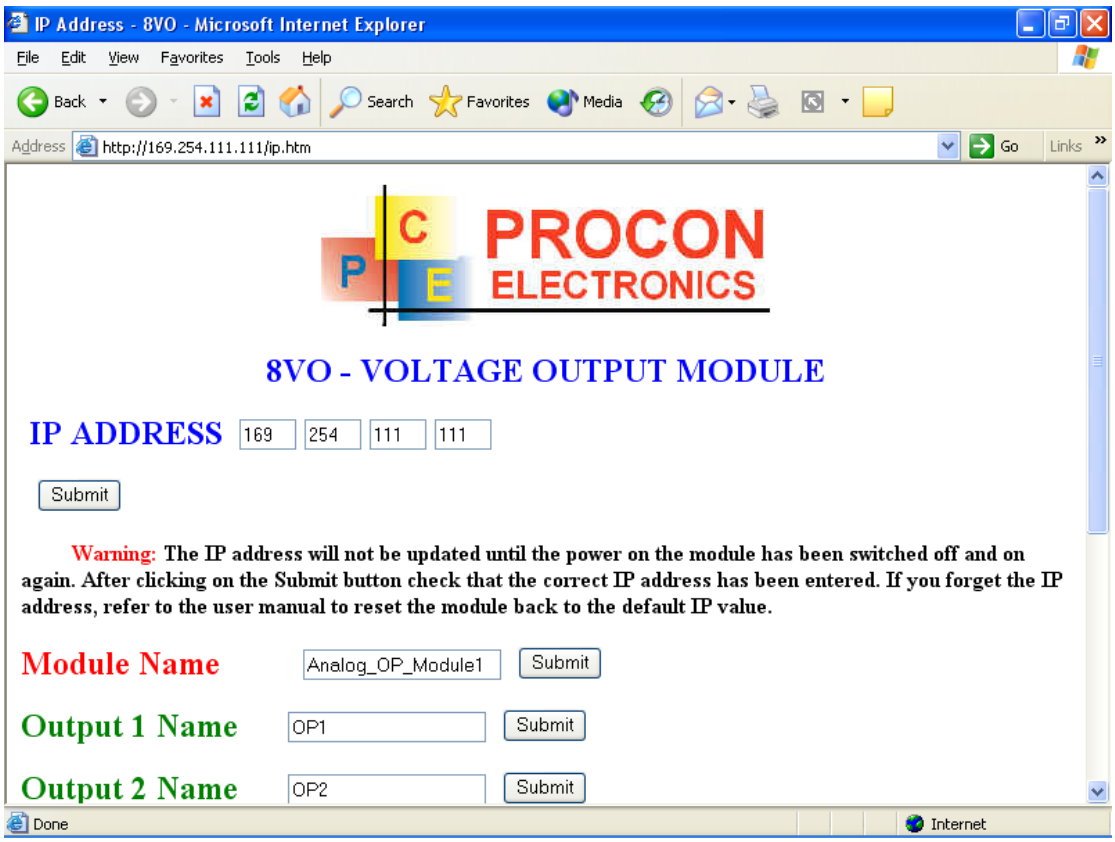
Power Supply: Logic	10 - 26 Vdc @	140 mA
Field	20 - 26 Vdc @	185 mA
Outputs:		
Voltage	0(2) - 10 V	
Resolution	12 bits	
Isolation	1500Vrms between field and logic	
Drift	100ppm/°C typ.	
Accuracy	0.05% of span	
Compliance	2000 ohms min. load	
Ethernet:	10BaseT - 10Mbits/s twisted pair	
Connector:	11 Pin Connector on rear of unit 10 Way screw connector on front RJ45 on front of module for 10BaseT Ethernet	

4.13.3 WIRING



4.13.4 CONFIGURATION

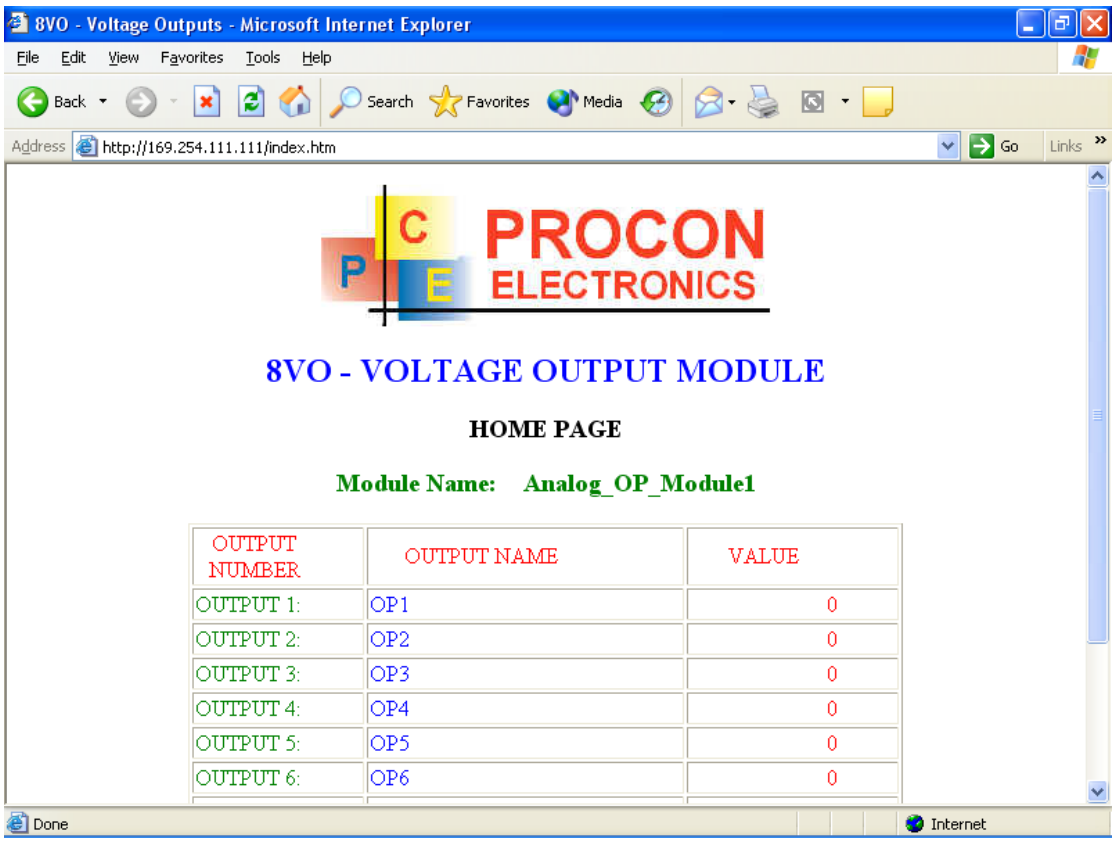
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.



- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.
- **Output Names:** These fields allow you to enter an output description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular output by name or number.

4.13.5 VIEWING WEB PAGES

To view the default Web page in the MOD-MUX TCP Module, start the Web browser and type "**169.254.111.111/index.htm**" into the address line of the browser window. The main page will now be displayed in the browser window.



- **Output Number:** This refers to the actual output number on the terminals of the module.
- **Output Name:** This is the name that was entered in the configuration page to best describe the outputs.
- **Value:** This is the current value of the outputs. To get an updated reading it is necessary to refresh the browser window to upload the web page again.

4.14 MMTCPCONV - MODBUS/TCP SERIAL CONVERTER

4.14.1 DESCRIPTION

The Modbus/TCP Serial Converter enables serial devices communicating on RS232/485 using the Modbus protocol, such as MOD-MUX modules, to be connected to an Ethernet network.

The Modbus/TCP Converter performs two functions. The first being a modbus converter from Ethernet to RS232/485, and the second being a Web Server for configuration and diagnostic purposes.

The converter communicates using the standard Modbus/TCP protocol. This protocol is supported by many of the SCADA packages which are on the market. The result is a very simple and efficient way of connecting MOD-MUX devices to a PC or PLC on an Ethernet network. The converter supports 4 TCP sockets. This means that up to 4 devices can communicate with the MOD-MUX modules via the converter at any one time.

An added advantage of using the converter, is that the Modbus RS485 network can be split into a number of smaller networks, each with a separate converter. This increases throughput dramatically as the single Ethernet network has a much higher bandwidth than the individual RS485 networks and overall data polling times are reduced accordingly.

Each Modbus/TCP Converter has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the converter is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

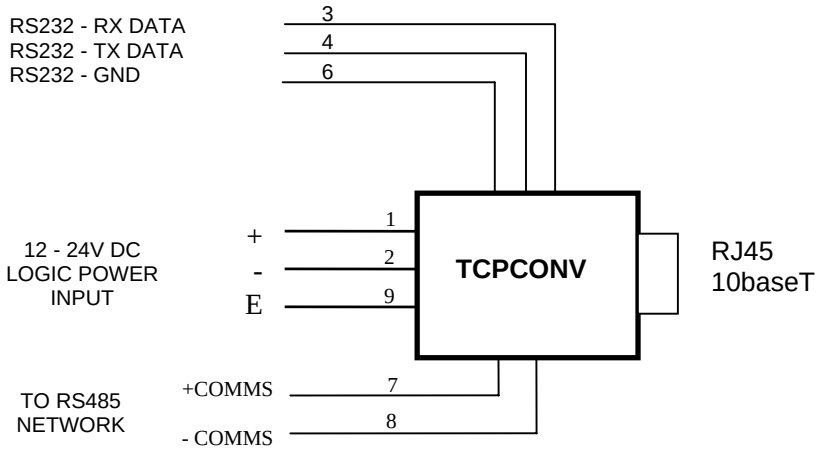
The web page address for viewing the setup parameters is http://169.254.111.111/index.htm
The web page address for configuring the converter is http://169.254.111.111/ip.htm

The master device which is polling the modules must be configured with the IP address of the converter and with the modbus ID of the MOD-MUX modules. As each RS485 network is separate, it is possible to have repeated MOD-MUX ID's on the RS485 networks. The IP address differentiates between the different RS485 networks. Consequently, many hundreds of MOD-MUX modules may be added to a Ethernet network.

4.14.2 SPECIFICATIONS

Power Supply:	10 - 26 Vdc @ 140 mA
Ethernet:	10BaseT - 10Mbits/s twisted pair
RS485:	2 Wire Multidrop twisted pair - Internal Jumper
RS232:	3 Wire , TX,RX,GND
Baud Rate:	2400, 4800, 9600 and 19200.
Data Bits:	5, 6, 7, 8 .
Parity:	none, even, odd.
Stop Bits:	1, 2.
Connector:	11 Pin Connector on rear of module RJ45 on front of module for 10Base-T Ethernet

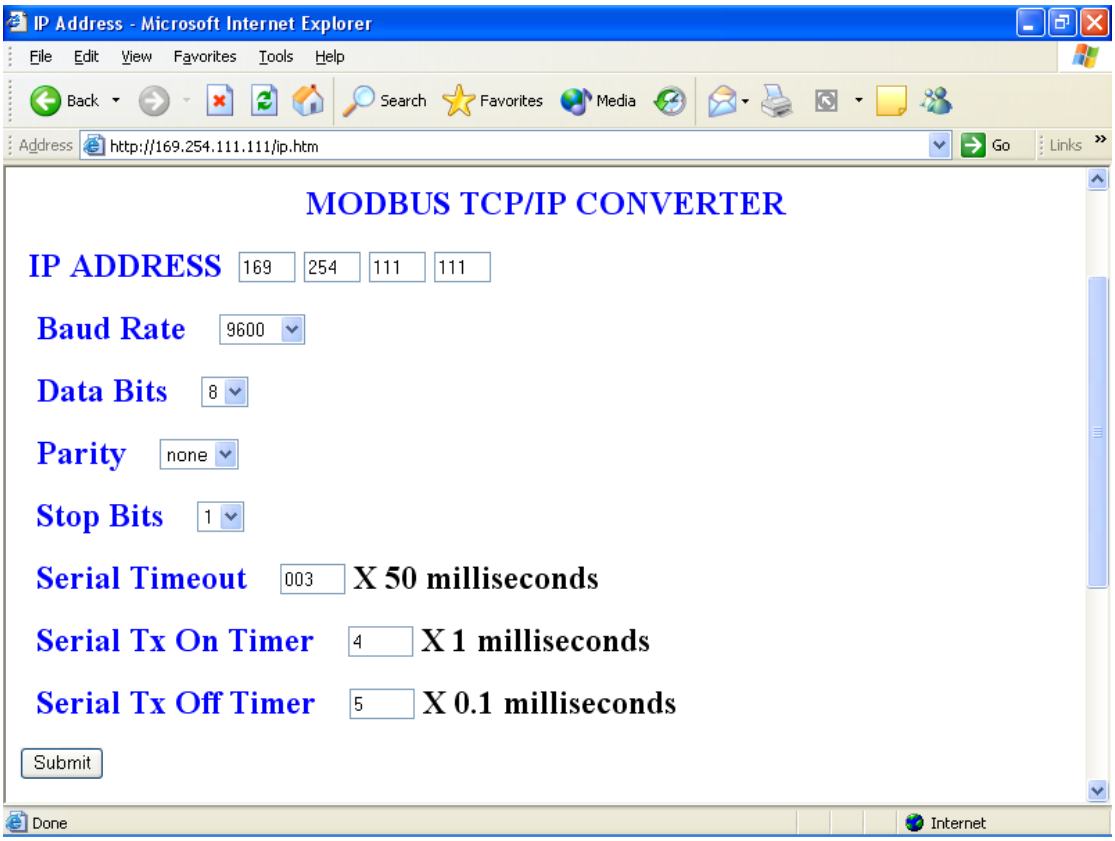
4.14.3 WIRING



Please Note: You must change an internal jumper to select RS232 or RS485

4.14.4 CONFIGURATION

The Web page address "169.254.111.111/ip.htm" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module, select serial timeout, to setup the baud rate of the MOD-MUX TCP Module on the RS485 network, and to enter a Module Description Name for identification/maintenance purposes.



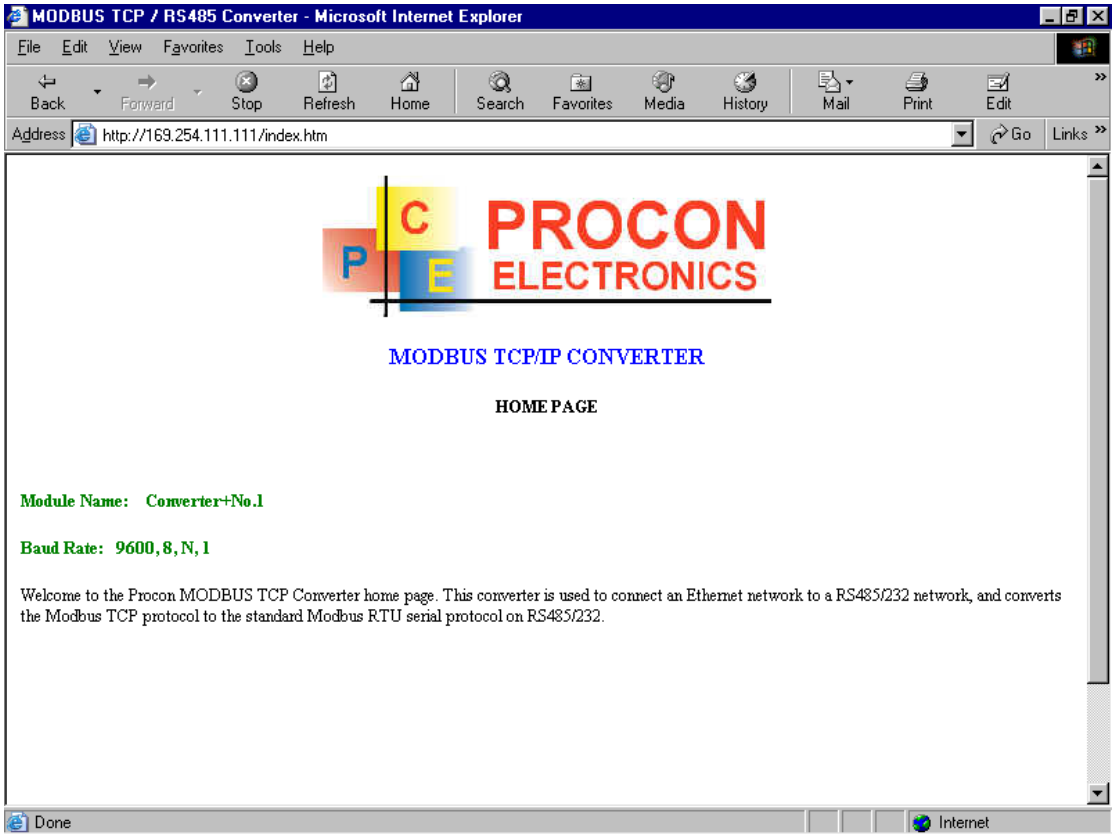
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Baud Rate, Data Bits, Parity, Stop Bits:** The configuration of the serial port can be configured by selecting the parameters from the pull-down menu. Click on the Submit button to load these values into the MOD-MUX TCP Module.
- **Serial Timeout:** This timeout is the time the module waits for a reply from a slave device. If a reply is received then this timeout is cancelled and the converter looks for the next TCP message. If the slave does not send a reply, then this timeout will expire and allow the converter to look for the next TCP message. This timeout must be longer than the turn-around time of the slave device or it will timeout before the slave replies.

- **Serial Tx On Time:** This is the time the RS485 transmitter will be enabled before data is transmitted. This has no effect on RS232 communications.
- **Serial Tx Off Time:** This is the time the RS485 transmitter will be enabled after data is transmitted. This has no effect on RS232 communications.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.

4.14.5 VIEWING WEB PAGES

The Converter has two built in web pages. The first being for checking the configuration and the second is for altering the configuration. To view these Web pages, a Web browser such as Internet Explorer or Netscape is needed.

To view the default Web page in the Converter, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page of the Converter will now be displayed in the browser window.



4.15 MMTCPBCONV - MODBUS/TCP SERIAL CONVERTER

4.15.1 DESCRIPTION

The Modbus/TCP Serial Boxed Converter enables serial devices communicating on RS232/485 using the Modbus protocol, such as MOD-MUX modules, to be connected to an Ethernet network.

The Modbus/TCP Converter performs two functions. The first being a modbus converter from Ethernet to RS232/485, and the second being a Web Server for configuration and diagnostic purposes.

The converter communicates using the standard Modbus/TCP protocol. This protocol is supported by many of the SCADA packages which are on the market. The result is a very simple and efficient way of connecting MOD-MUX devices to a PC or PLC on an Ethernet network. The converter supports 4 TCP sockets. This means that up to 4 devices can communicate with the MOD-MUX modules via the converter at any one time.

An added advantage of using the converter, is that the Modbus RS485 network can be split into a number of smaller networks, each with a separate converter. This increases throughput dramatically as the single Ethernet network has a much higher bandwidth than the individual RS485 networks and overall data polling times are reduced accordingly.

Each Modbus/TCP Converter has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the converter is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

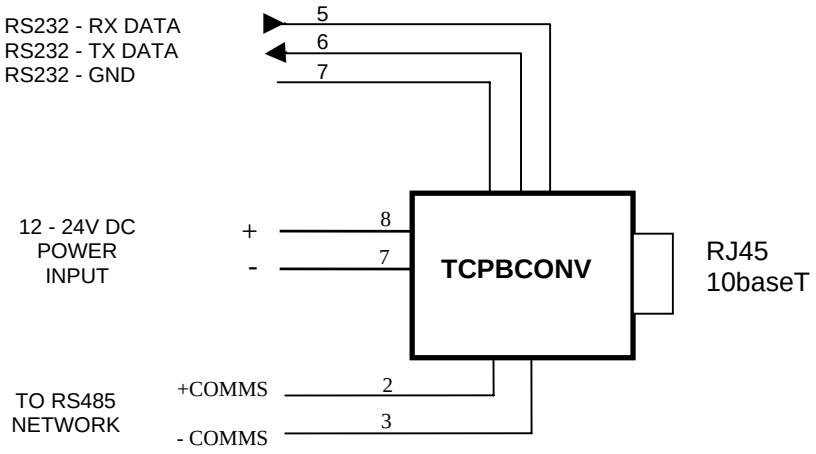
The web page address for viewing the setup parameters is http://169.254.111.111/index.htm
The web page address for configuring the converter is http://169.254.111.111/ip.htm

The master device which is polling the modules must be configured with the IP address of the converter and with the modbus ID of the MOD-MUX modules. As each RS485 network is separate, it is possible to have repeated MOD-MUX ID's on the RS485 networks. The IP address differentiates between the different RS485 networks. Consequently, many hundreds of MOD-MUX modules may be added to a Ethernet network.

4.15.2 SPECIFICATIONS

Power Supply:	10 - 26 Vdc @ 140 mA.
Ethernet:	10BaseT - 10Mbits/s twisted pair.
RS485:	2 Wire Multidrop twisted pair - Internal Jumper.
RS232:	3 Wire , TX,RX,GND.
Baud Rate:	2400, 4800, 9600 and 19200.
Data Bits:	5, 6, 7, 8 .
Parity:	none, even, odd.
Stop Bits:	1, 2.
Connector:	8 Way screw terminals on removable plug. RJ45 for 10Base-T Ethernet.

4.15.3 WIRING



Please Note: You must change an internal jumper to select RS232 or RS485

4.15.4 CONFIGURATION

The configuration of the MMTCPBCONV is identical to the MMTCPCONV. Refer to the previous chapters for this information.

4.16 MMTCPMCONV - MODBUS MASTER SERIAL/TCP CONVERTER

4.16.1 DESCRIPTION

The Modbus Master Serial/TCP Converter enables serial devices communicating on RS232/485 using the Modbus Master protocol, such as Operator Interfaces, to be connected to an Ethernet network.

The Modbus Master Converter performs two functions. The first being a modbus converter from RS232/485 to Ethernet, and the second being a Web Server for configuration and diagnostic purposes.

The converter communicates using the standard Modbus/TCP protocol. The converter supports 4 TCP sockets. This means that a Modbus Master can communicate with up to 4 TCP slave devices.

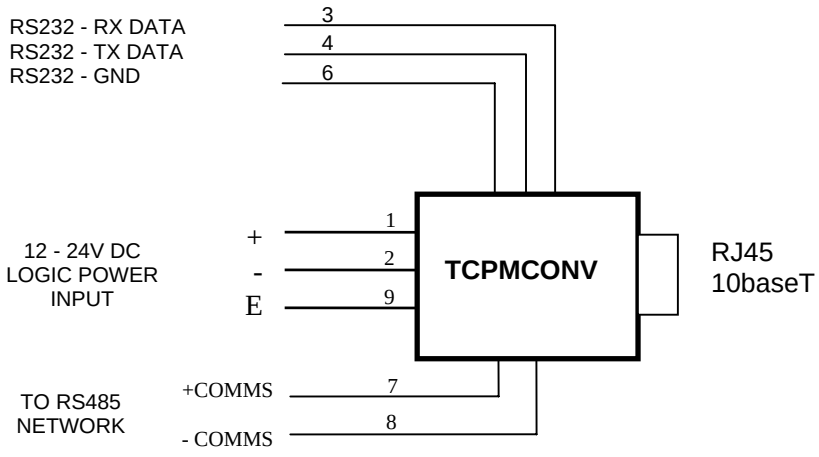
Each Modbus Master Serial/TCP Converter has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the converter is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages were configuration is carried out. The converters are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the converter is added to an existing network.

The web page address for viewing the setup parameters is http://169.254.111.111/index.htm
The web page address for configuring the converter is http://169.254.111.111/ip.htm

4.16.2 SPECIFICATIONS

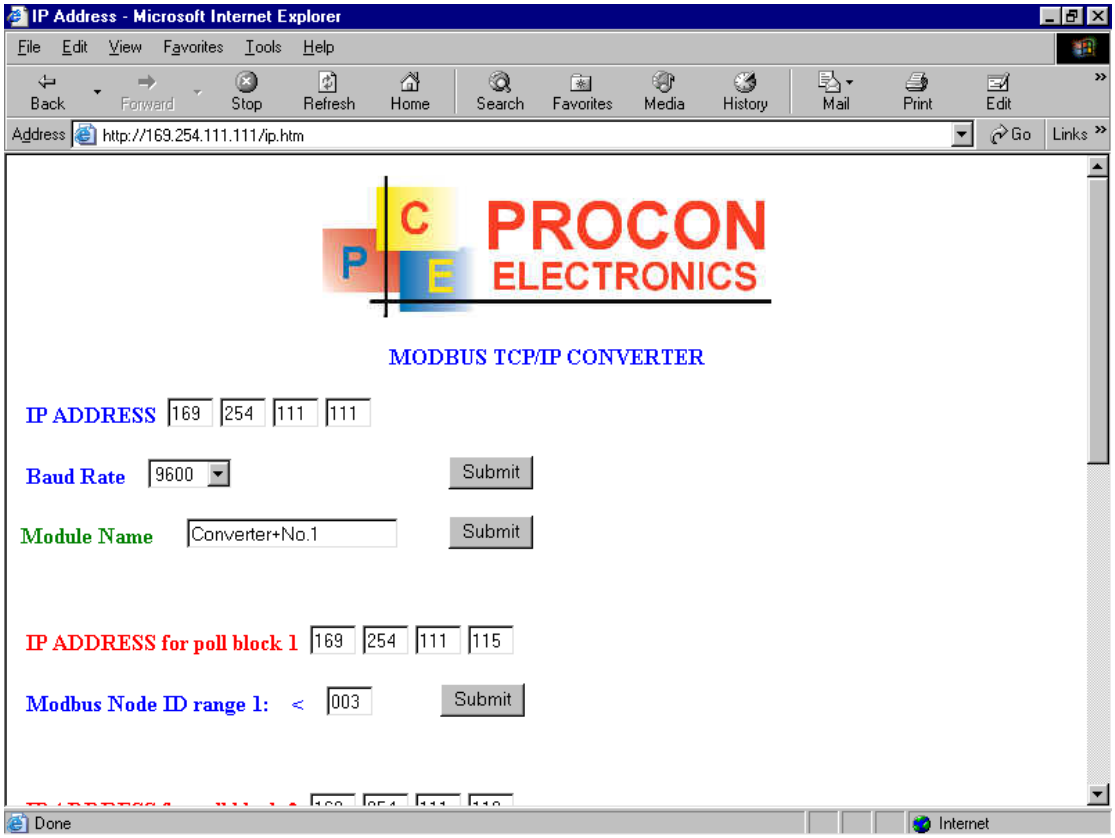
Power Supply:	10 - 26 Vdc @ 140 mA
Ethernet:	10BaseT - 10Mbits/s twisted pair
RS485:	2 Wire Multidrop twisted pair - Internal Jumper
RS232:	3 Wire , TX,RX,GND
Baud Rate:	2400, 4800, 9600 and 19200.
Data Bits:	5, 6, 7, 8 .
Parity:	none, even, odd.
Stop Bits:	1, 2.
Connector:	11 Pin Connector on rear of module RJ45 on front of module for 10Base-T Ethernet

4.16.3 WIRING



4.16.4 CONFIGURATION

The Web page address "169.254.111.111/ip.htm" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module, enter the IP addresses of the slave devices, the range of slave ID's, setup the baud rate of the MOD-MUX TCP Module on the RS485 network, and enter a Module Description Name for identification/maintenance purposes.



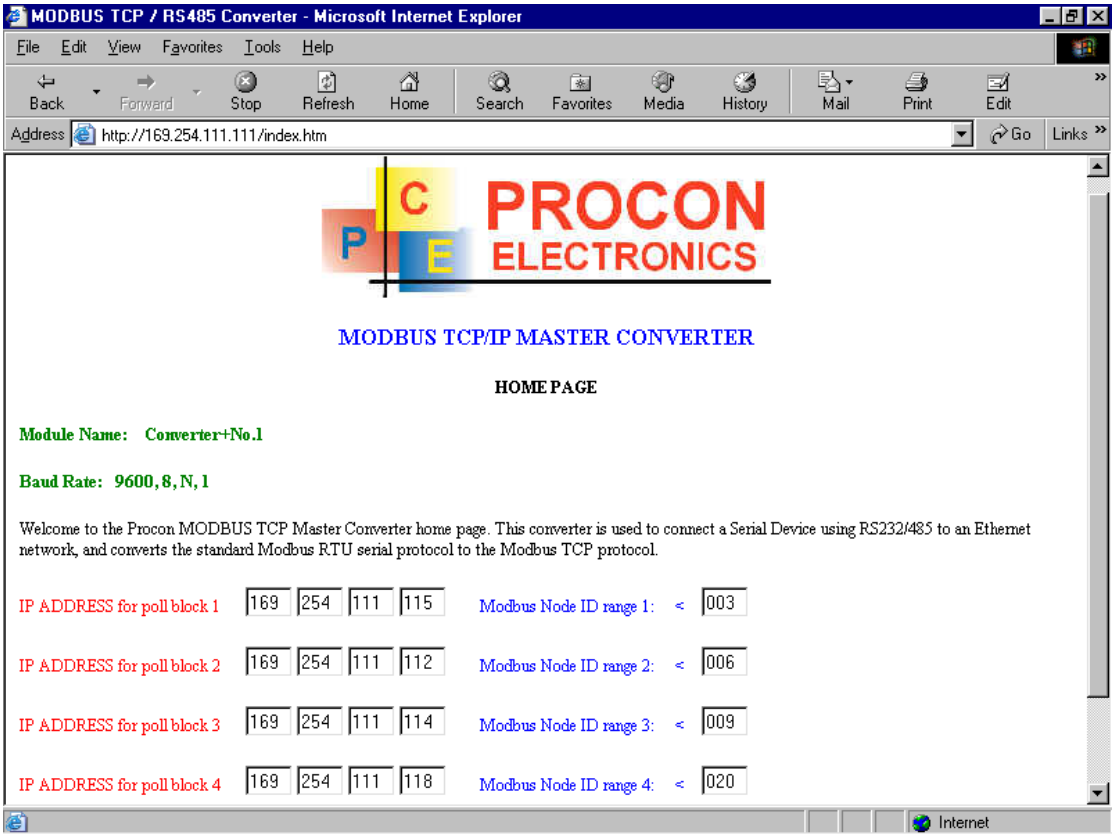
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the MOD-MUX TCP Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the MOD-MUX TCP Module power has been switched off and on again. This feature allows you to check that the correct IP address has been entered before being activated. If the IP address has been entered incorrectly and the power has not been switched off, it is possible to re-enter the correct IP address. If the power has been switched off and back on again, the MOD-MUX TCP Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Baud Rate:** The baud rate of the RS485 network can be configured by selecting a baud rate from the pull-down menu. Click on the Submit button to load this value into the MOD-MUX TCP Module.
- **Module Name:** This field allows you to enter a module description name into the MOD-MUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the MOD-MUX TCP Module in the system by name or number.

- **Slave IP Address Poll Block:** The converter can be configured for 4 poll blocks. Each poll block is assigned an IP address. This is the IP address of the slave TCP device.
- **Modbus Node ID Range:** Each poll block can communicate with a range of slave modbus ID's. Poll block 1 has the low range, Poll block 2 has the next range and Poll block 4 has the upper range.

4.16.5 VIEWING WEB PAGES

The Converter has two built in web pages. The first being for checking the configuration and the second is for altering the configuration. To view these Web pages, a Web browser such as Internet Explorer or Netscape is needed.

To view the default Web page in theConverter, start the Web browser and type "169.254.111.111" into the address line of the browser window. The main page of the Converter will now be displayed in the browser window.



5. DATA ADDRESSES

The data in the modules is stored in registers. These registers are accessed over the network using the MODBUS TCP communication protocol.

There are 4 types of variables which can be accessed from the module. Each module has one or more of these data variables.

Type	Start Address	Variable
1	00001	Digital Outputs
2	10001	Digital Inputs
3	30001	Input registers (Analog)
4	40001	Output registers (Analog)

5.1 MMTCP16DI - DIGITAL INPUTS (MODULE TYPE = 59)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
10001	Digital Input 1	0	1	R	Status of Digital Inputs.
10002	Digital Input 2	0	1	R	"
10003	Digital Input 3	0	1	R	"
10004	Digital Input 4	0	1	R	"
10005	Digital Input 5	0	1	R	"
10006	Digital Input 6	0	1	R	"
10007	Digital Input 7	0	1	R	"
10008	Digital Input 8	0	1	R	"
10009	Digital Input 9	0	1	R	"
10010	Digital Input 10	0	1	R	"
10011	Digital Input 11	0	1	R	"
10012	Digital Input 12	0	1	R	"
10013	Digital Input 13	0	1	R	"
10014	Digital Input 14	0	1	R	"
10015	Digital Input 15	0	1	R	"
10016	Digital Input 16	0	1	R	"
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 59
30002	Digital Inputs	N/A	N/A	R	Digital Inputs in 16 bits. 16 - 1.
40003	Counter 1 MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40004	Counter 1 LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40005	Counter 2 MSB	0	65535	R/W	"
40006	Counter 2 LSB	0	65535	R/W	"
40007	Counter 3 MSB	0	65535	R/W	"
40008	Counter 3 LSB	0	65535	R/W	"
40009	Counter 4 LSB	0	65535	R/W	"
40010	Counter 4 LSB	0	65535	R/W	"
40011	Counter 5 MSB	0	65535	R/W	"
40012	Counter 5 LSB	0	65535	R/W	"
40013	Counter 6 MSB	0	65535	R/W	"
40014	Counter 6 LSB	0	65535	R/W	"
40015	Counter 7 MSB	0	65535	R/W	"
40016	Counter 7 LSB	0	65535	R/W	"
40017	Counter 8 MSB	0	65535	R/W	"
40018	Counter 8 LSB	0	65535	R/W	"
40019	Counter Mode	0	2	R/W	0 = disabled, 1 = Up Counting, 2 = Up/Down Counting
40020	Input Filter	0	255	R/W	Debounce filter X 10 milliseconds.

5.2 MMTCP16DO - DIGITAL OUTPUTS (MODULE TYPE = 72)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
00001	Digital Output 1	0	1	R/W	Status of Digital Outputs.
00002	Digital Output 2	0	1	R/W	"
00003	Digital Output 3	0	1	R/W	"
00004	Digital Output 4	0	1	R/W	"
00005	Digital Output 5	0	1	R/W	"
00006	Digital Output 6	0	1	R/W	"
00007	Digital Output 7	0	1	R/W	"
00008	Digital Output 8	0	1	R/W	"
00009	Digital Output 9	0	1	R/W	"
00010	Digital Output 10	0	1	R/W	"
00011	Digital Output 11	0	1	R/W	"
00012	Digital Output 12	0	1	R/W	"
00013	Digital Output 13	0	1	R/W	"
00014	Digital Output14	0	1	R/W	"
00015	Digital Output 15	0	1	R/W	"
00016	Digital Output 16	0	1	R/W	"
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 72
40002	Digital Outputs	N/A	N/A	R/W	Digital Outputs in 16 bits. 16 - 1.
40003	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 - 255 = enabled.

5.3 MMTCP8DIO - DIGITAL INPUTS/OUTPUTS (MODULE TYPE = 73)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
10001	Digital Input 1	0	1	R	Status of Digital Inputs.
10002	Digital Input 2	0	1	R	"
10003	Digital Input 3	0	1	R	"
10004	Digital Input 4	0	1	R	"
10005	Digital Input 5	0	1	R	"
10006	Digital Input 6	0	1	R	"
10007	Digital Input 7	0	1	R	"
10008	Digital Input 8	0	1	R	"
00009	Digital Output 1	0	1	R/W	Status of Digital Outputs.
00010	Digital Output 2	0	1	R/W	"
00011	Digital Output 3	0	1	R/W	"
00012	Digital Output 4	0	1	R/W	"
00013	Digital Output 5	0	1	R/W	"
00014	Digital Output 6	0	1	R/W	"
00015	Digital Output 7	0	1	R/W	"
00016	Digital Output 8	0	1	R/W	"
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 73
40002	Digital I/O	N/A	N/A	R/W	Digital Outputs in bits. 16 - 9, Inputs 8 - 1.
40003	Counter 1 MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40004	Counter 1 LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40005	Counter 2 MSB	0	65535	R/W	"
40006	Counter 2 LSB	0	65535	R/W	"
40007	Counter 3 MSB	0	65535	R/W	"
40008	Counter 3 LSB	0	65535	R/W	"
40009	Counter 4 MSB	0	65535	R/W	"
40010	Counter 4 LSB	0	65535	R/W	"
40011	Counter 5 MSB	0	65535	R/W	"
40012	Counter 5 LSB	0	65535	R/W	"
40013	Counter 6 MSB	0	65535	R/W	"
40014	Counter 6 LSB	0	65535	R/W	"
40015	Counter 7 MSB	0	65535	R/W	"
40016	Counter 7 LSB	0	65535	R/W	"
40017	Counter 8 MSB	0	65535	R/W	"
40018	Counter 8 LSB	0	65535	R/W	"
40019	Counter Mode	0	1	R/W	0 = Disable, 1 = Up Counting, 2 = Up/Down Counting
40020	Input Filter	0	255	R/W	Debounce filter X 10 milliseconds.
40021	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 - 255 = enabled.

5.4 MMTCP8AI - ANALOG INPUTS (MODULE TYPE = 53)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 53
30002	Analog Input 1	0	4095	R	Analog Input lower 12 Bits
30003	Analog Input 2	0	4095	R	"
30004	Analog Input 3	0	4095	R	"
30005	Analog Input 4	0	4095	R	"
30006	Analog Input 5	0	4095	R	"
30007	Analog Input 6	0	4095	R	"
30008	Analog Input 7	0	4095	R	"
30009	Analog Input 8	0	4095	R	"

5.5 MMTCP8AI/I ISO - ISOLATED CURRENT INPUTS (MODULE TYPE = 67)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 67
30002	Input 1	-x.xxx	y.yyy	R	Current Inputs. See table for range.
30003	Input 2	-x.xxx	y.yyy	R	"
30004	Input 3	-x.xxx	y.yyy	R	"
30005	Input 4	-x.xxx	y.yyy	R	"
30006	Input 5	-x.xxx	y.yyy	R	"
30007	Input 6	-x.xxx	y.yyy	R	"
30008	Input 7	-x.xxx	y.yyy	R	"
30009	Input 8	-x.xxx	y.yyy	R	"
40010	Type	1	3	R/W	See Table.

5.6 MMTCP8AI/V ISO - ISOLATED VOLTAGE INPUTS (MODULE TYPE = 80)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 80
30002	Input 1	-x.xxx	y.yyy	R	Voltage Inputs. See table for range.
30003	Input 2	-x.xxx	y.yyy	R	"
30004	Input 3	-x.xxx	y.yyy	R	"
30005	Input 4	-x.xxx	y.yyy	R	"
30006	Input 5	-x.xxx	y.yyy	R	"
30007	Input 6	-x.xxx	y.yyy	R	"
30008	Input 7	-x.xxx	y.yyy	R	"
30009	Input 8	-x.xxx	y.yyy	R	"
40010	Type	1	5	R/W	See Table.

5.7 MMTCP8TC - THERMOCOUPLE INPUTS (MODULE TYPE = 55)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 55
30002	TC Input 1	-xxx.x	yyyy.y	R	Thermocouple Inputs. See table for range.
30003	TC Input 2	-xxx.x	yyyy.y	R	Resolution in 0.1°C.
30004	TC Input 3	-xxx.x	yyyy.y	R	"
30005	TC Input 4	-xxx.x	yyyy.y	R	"
30006	TC Input 5	-xxx.x	yyyy.y	R	"
30007	TC Input 6	-xxx.x	yyyy.y	R	"
30008	TC Input 7	-xxx.x	yyyy.y	R	"
30009	TC Input 8	-xxx.x	yyyy.y	R	"
30010	CJC Temp.	-xxx.x	yyyy.y	R	CJC Temperature in 0.1°C resolution.
40011	TC Type	1	13	R/W	See TC Tables.

5.8 MMTCP8TCISO - ISOLATED TC INPUTS (MODULE TYPE = 68)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 68
30002	TC Input 1	-xxx.x	yyyy.y	R	Thermocouple Inputs. See table for range.
30003	TC Input 2	-xxx.x	yyyy.y	R	Resolution in 0.1°C.
30004	TC Input 3	-xxx.x	yyyy.y	R	"
30005	TC Input 4	-xxx.x	yyyy.y	R	"
30006	TC Input 5	-xxx.x	yyyy.y	R	"
30007	TC Input 6	-xxx.x	yyyy.y	R	"
30008	TC Input 7	-xxx.x	yyyy.y	R	"
30009	TC Input 8	-xxx.x	yyyy.y	R	"
30010	CJC Temp.	-xxx.x	yyyy.y	R	CJC Temperature in 0.1°C resolution.
40011	TC Type	1	13	R/W	See TC Tables.

5.9 MMTCP6RTD - RTD INPUTS (MODULE TYPE = 56)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 56
30002	RTD Input 1	-xxx.x	yyyy.y	R	RTD Inputs. See table for range.
30003	RTD Input 2	-xxx.x	yyyy.y	R	Resolution in 0.1°C.
30004	RTD Input 3	-xxx.x	yyyy.y	R	"
30005	RTD Input 4	-xxx.x	yyyy.y	R	"
30006	RTD Input 5	-xxx.x	yyyy.y	R	"
30007	RTD Input 6	-xxx.x	yyyy.y	R	"
40008	RTD Type	1	2	R/W	See RTD Tables.

5.10 MMTCPDIOAIO - DIGITAL INPUTS / OUTPUTS (MODULE TYPE = 76)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
10001	Digital Input 1	0	1	R	Status of Digital Inputs.
10002	Digital Input 2	0	1	R	"
10003	Digital Input 3	0	1	R	"
10004	Digital Input 4	0	1	R	"
10005	Digital Input 5	0	1	R	"
00009	Digital Output 1	0	1	R/W	Status of Digital Outputs.
00010	Digital Output 2	0	1	R/W	"
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 76
40002	Digital I/O	N/A	N/A	R/W	Digital Outputs in bits. 10 - 9, Inputs 5 - 1.
40003	RTD Input 1	-xxx.x	yyyy.y	R	RTD Inputs. See table for range.
40004	RTD Input 2	-xxx.x	yyyy.y	R	Resolution in 0.1°C.
40005	Analog Input 1	0	4095	R	Analog Input lower 12 Bits
40006	Analog Input 2	0	4095	R	Analog Input lower 12 Bits
40007	Analog Output 1	0	4095	R/W	Analog Output lower 12 Bits
40008	Counter 1 MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40009	Counter 1 LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40010	Counter 2 MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40011	Counter 2 LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40012	RTD 1 Type	1	2	R/W	See RTD Tables.
40013	RTD 2 Type	1	2	R/W	See RTD Tables.
40014	Analog Input 1 Type	1	2	R/W	1 = 0-20mA, 2 = 0-10V
40015	Analog Input 2 Type	1	2	R/W	"
40016	Analog Output Type	1	2	R/W	"
40017	Counter Mode	0	1	R/W	0 = Disable, 1 = Up Counting, 2 = Up/Down Counting
40018	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 - 255 = enabled.

5.11 MMTCP8AO - ANALOG OUTPUTS (MODULE TYPE = 58)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 58
40002	Analog Output 1	0	4095	R/W	Analog Outputs. 0 - 4095 = 0(4) - 20mA.
40003	Analog Output 2	0	4095	R/W	"
40004	Analog Output 3	0	4095	R/W	"
40005	Analog Output 4	0	4095	R/W	"
40006	Analog Output 5	0	4095	R/W	"
40007	Analog Output 6	0	4095	R/W	"
40008	Analog Output 7	0	4095	R/W	"
40009	Analog Output 8	0	4095	R/W	"

5.12 MMTCP8VO - ANALOG OUTPUTS (MODULE TYPE = 74)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 74
40002	Analog Output 1	0	4095	R/W	Analog Outputs. 0 - 4095 = 0(2) – 10V.
40003	Analog Output 2	0	4095	R/W	"
40004	Analog Output 3	0	4095	R/W	"
40005	Analog Output 4	0	4095	R/W	"
40006	Analog Output 5	0	4095	R/W	"
40007	Analog Output 6	0	4095	R/W	"
40008	Analog Output 7	0	4095	R/W	"
40009	Analog Output 8	0	4095	R/W	"

6. SPECIFICATIONS

6.1 ENVIRONMENTAL

Operating Temperature	-5°C to +65°C
Storage Temperature	-20°C to +85°C
Humidity	Up to 95% non condensing.

6.2 EMC INSTALLATION INSTRUCTIONS

1. Screened twisted pair cable must be used with the screen grounded at one point only.
2. Use should be made of screened I/O, T/C, RTD cable with the screens grounded at one point as close to the MOD-MUX module as possible.

6.3 CONFORMITY CERTIFICATE

DECLARATION OF CONFORMITY
according to EN 45014

Manufacturer's Name:	Procon Electronics CC
Manufacturer's Address:	26 Wareing Park 2 Wareing Road Pinetown 3610 South Africa

declares that the product

Product Name:	MOD-MUX TCP
Model Number(s):	MMTCP16DI, MMTCP16DO, MMTCP8DIO, MMTCP8AI/I, MMTCP8AI/V, MMTCP8AI/IISO, MMTCPDIOAIO, MMTCP8AO, MMTCP8VO, MMTCP8TC, MMTCP8TCISO, MMTCP6RTD, MMTCPCONV,MMTCPMCONV, MMPSU150, MMPSU151

complies with EMC Directive 89/336/EEC and Low Voltage Equipment Directive 73/23/EEC and conforms to the following Product specifications:

Safety:	IEC 950
EMC:	IEC 61000-4-2-A1 Level 2
	IEC 61000-4-3-A1 Level 2
	IEC 61000-4-4 Level 3
	CISPR 11:1991-A1 / EN 55011:1998 Group 1 Class A

Pinetown, SA — Location
October 2001 — Date
D.Ruddock