PROMUX TCP

Distributed MODBUS TCP I/O Modules

PROCON ELECTRONICS

PT6RTD

6RTD - RTD MODULE

HOME PAGE

Module Name: PT6RTD

CHANNEL NUMBER	CHANNEL NAME	VALUE
CHANNEL 1:	INPUT_1	-3276.8 °C
CHANNEL 2:	INPUT_2	-3276.8 °C
CHANNEL 3:	INPUT_3	-3276.8 °C
CHANNEL 4:	INPUT_4	-3276.8 °C
CHANNEL 5:	INPUT_5	-3276.8 °C
CHANNEL 6:	INPUT_6	-3276.8 °C

INPUT TYPE: PT100

Catalog and Design Guide

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1. AN OVERVIEW OF THE PROMUX TCP I/O SYSTEM

1.1 Introduction

PROMUX **TCP** is an innovative modular I/O system which provides a simple solution for distributed I/O requirements. The PROMUX TCP system consists of stand-alone Digital and Analog Input and Output modules which are connected together on an **ETHERNET** 10/100Base-T network using the **MODBUS TCP** protocol.

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

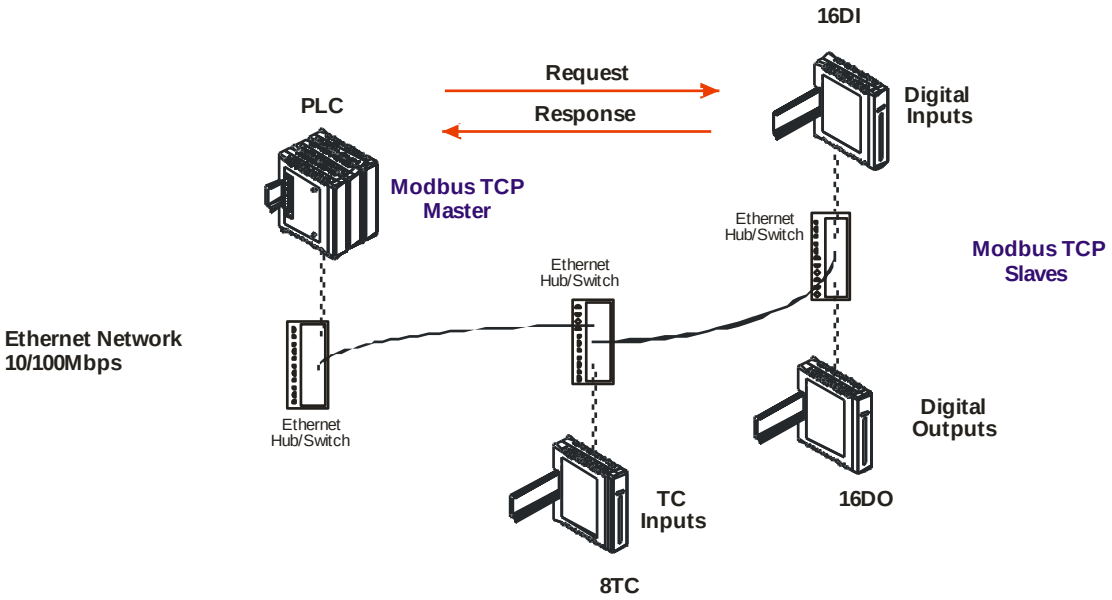
All PROMUX TCP modules plug directly onto an industry standard DIN rail. All modules have isolation between the field and logic.

1.2 Application Configurations

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

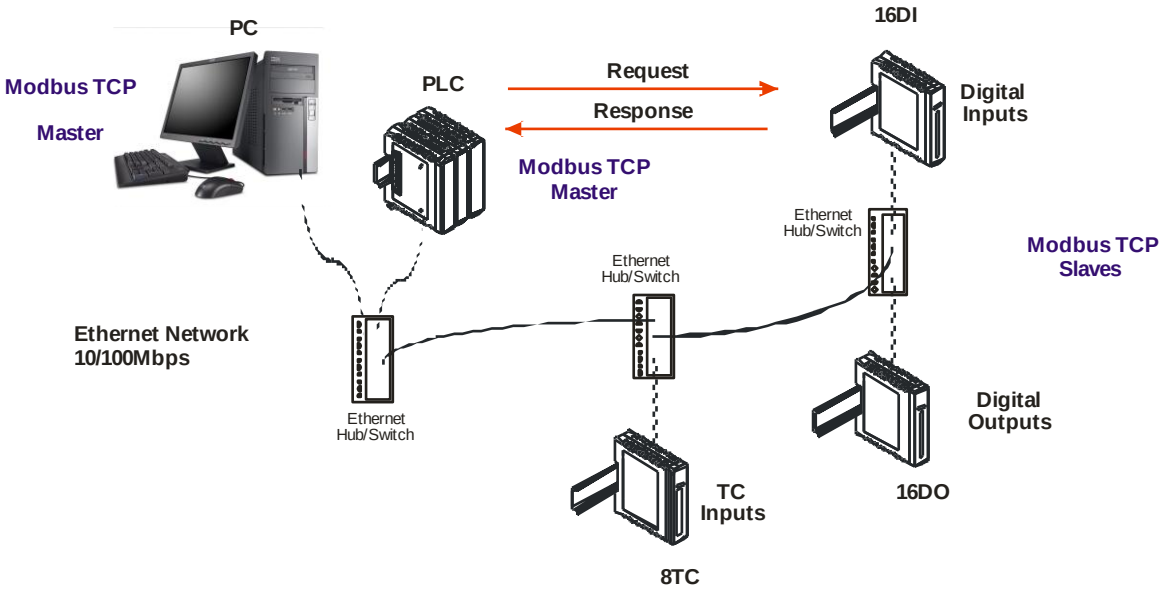
1.2.1 I/O Expansion.

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, PROMUX TCP Modules may be used as remote I/O reducing cabling costs and increasing the I/O capability of the PLC.



1.2.2 Data Acquisition.

Another use of the PROMUX 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.



1.3 MODULE SELECTION TABLE

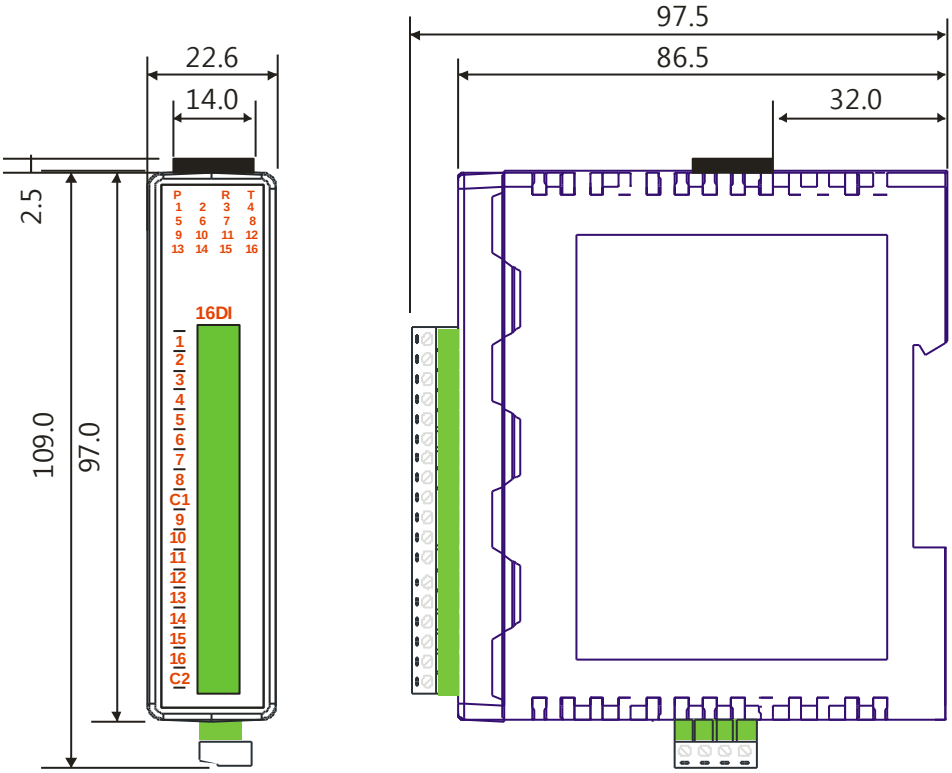
MODEL	MODULE TYPE
I/O MODULES	
PT16DI	16 DIGITAL INPUT MODULE INCLUDING 8 COUNTERS
PT16DIB	16 DIGITAL INPUT MODULE INCLUDING 8 COUNTERS – Non Volatile
PT16DO	16 DIGITAL OUTPUT MODULE
PT8DIO	8 DIGITAL INPUT / 8 DIGITAL OUTPUT MODULE
PT4RO	4 RELAY OUTPUT MODULE
PT8AIIS	8 ANALOG INPUT 0 - 20mA FULLY ISOLATED
PT8AIVS	8 ANALOG INPUT 0 - 1/10V FULLY ISOLATED
PT8AOI	8 ANALOG OUTPUT MODULE 0(4)- 20mA
PT8AOV	8 ANALOG OUTPUT MODULE 0 – 10V
PT8TCS	8 TC INPUT MODULE INCL. 0 - 50mV I/P FULLY ISOLATED
PT6RTD	6 RTD INPUT MODULE - PT100, Ni120, PT1000, Ni1000, Ni1000LG

2. PROMUX TCP GENERAL INFORMATION

2.1 Physical Dimensions

The PROMUX TCP enclosure is shown below. The module clips directly onto an industry standard DIN rail. Field wiring is on the front of the module via a separate plug in connector. The module power wiring is on a separate plug in connector on the underside of the housing and the Ethernet communications plugs into a RJ45 connector on the top of the housing.

Allow at least 25mm on front, below and above the module to accommodate the wiring. Ensure that enough space is kept above and below the module for good ventilation.



2.2 GROUNDING/SHIELDING

In most cases, PROMUX TCP 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

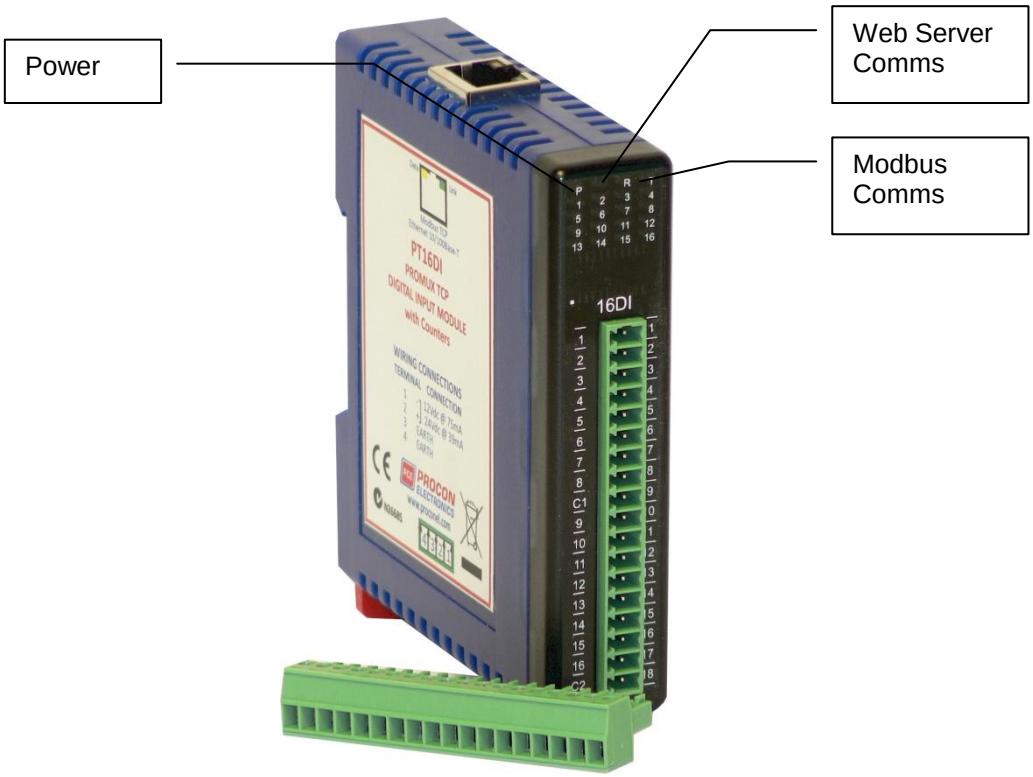
3.1 Hardware Connections

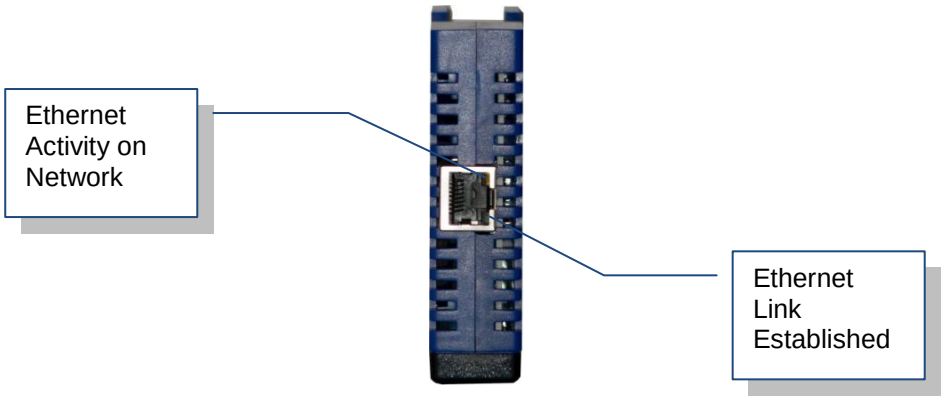
The PROMUX TCP Module must be clipped onto a DIN rail. Power must be applied to terminal 1 (0V) and terminal 2 (+24VDC). The power LED will illuminate and flash when power is applied.

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 PROMUX TCP Module are used to indicate the operation of the module.



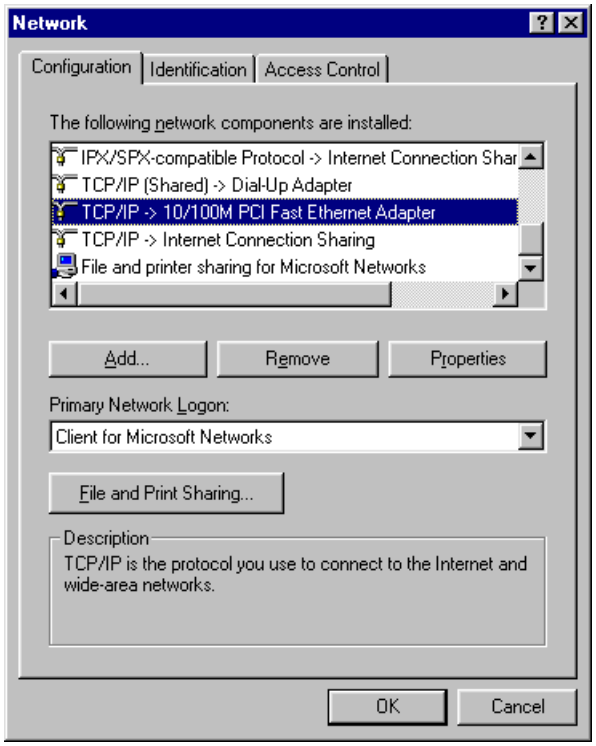


3.3 Connecting to a PC which is not connected to a network

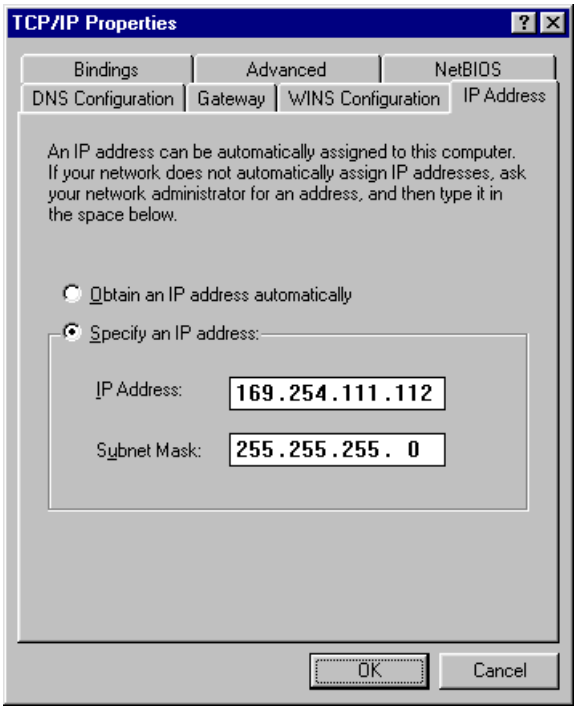
If the PC is equipped with an Ethernet card but not connected to a network, a local network address should be used for communication between the PROMUX TCP Module and the PC. The PROMUX TCP Module is shipped with a default IP address 169.254.111.111. This address is in the address area reserved for local networks not connected to the Internet. For direct connection between the PC and the PROMUX TCP Module, a crossover Ethernet cable is required.

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

- Connect the PC and the PROMUX 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



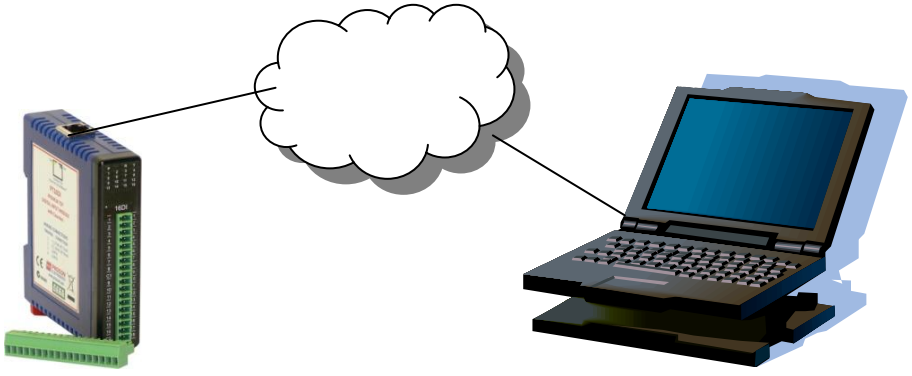
- Click the properties button. A TCP/IP Properties box similar to the one below should appear



- 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 PROMUX 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 PROMUX 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 PROMUX TCP Module is required. Contact the local network administrator to be assigned a free IP address for the PROMUX TCP Module. The new IP address is programmed into the PROMUX TCP Module using a Web browser software such as Internet explorer. In this case the PROMUX TCP Module must first be connected directly to a PC as described above.



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 PROMUX 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:

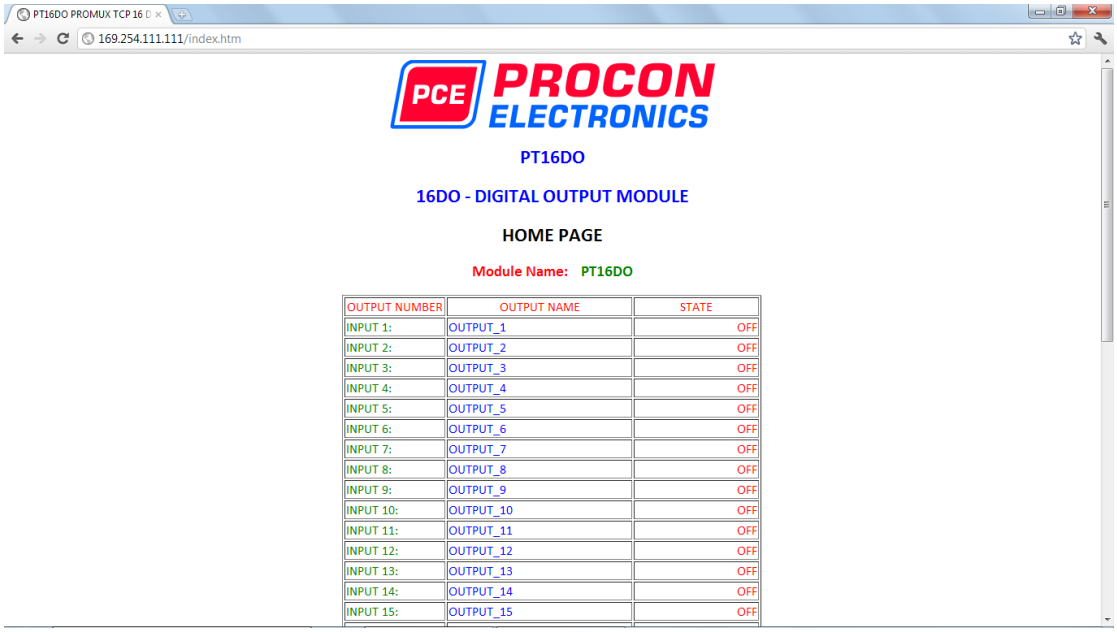
- If the PC is connected in a network, change the IP address to an address accessible from the local network.
- If the PROMUX TCP Module is connected directly to the PC(or through a hub), change the PC's IP address to one in the same address range as the PROMUX TCP Module.

If there is a problem with the PROMUX TCP Module the program will respond:
"**Request timed out**", this means that the PROMUX TCP Module cannot 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 PROMUX 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.

To view the default Web page in the PROMUX 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 PROMUX TCP Module will now be displayed in the browser window.



OUTPUT NUMBER	OUTPUT NAME	STATE
INPUT 1:	OUTPUT_1	OFF
INPUT 2:	OUTPUT_2	OFF
INPUT 3:	OUTPUT_3	OFF
INPUT 4:	OUTPUT_4	OFF
INPUT 5:	OUTPUT_5	OFF
INPUT 6:	OUTPUT_6	OFF
INPUT 7:	OUTPUT_7	OFF
INPUT 8:	OUTPUT_8	OFF
INPUT 9:	OUTPUT_9	OFF
INPUT 10:	OUTPUT_10	OFF
INPUT 11:	OUTPUT_11	OFF
INPUT 12:	OUTPUT_12	OFF
INPUT 13:	OUTPUT_13	OFF
INPUT 14:	OUTPUT_14	OFF
INPUT 15:	OUTPUT_15	OFF

If no Web page is displayed, go back to testing the network connection to the PROMUX TCP Module by using the ping command. If the PROMUX TCP Module replies to the ping messages, check the setup of the Web browser. If the PROMUX 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 PROMUX 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 Resetting the module to factory default

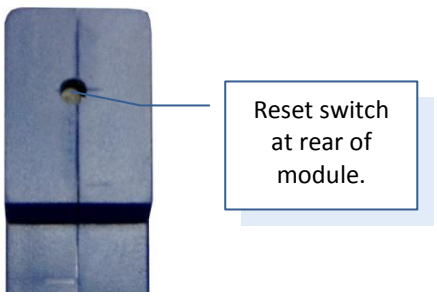
In the event that the programmed IP address of the module is lost, it is possible to reset the module to the factory IP address.

The following parameters are reset:

- IP address
- Default gateway address
- Subnet mask

The Module can be reset to the factory default by performing the following procedure:

1. Switch off power to the module.
2. Remove the module from the DIN rail.
3. Press in the reset switch at the rear of the module using a small screw driver.
4. Switch on the power whilst the switch is on.
5. Wait 5 seconds.
6. Remove the screw driver and switch off the power.
7. Replace the module.



3.8 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 PROMUX TCP Module is connected to the network.
2	Does the PROMUX TCP Module respond to PING requests?	No	Either the PC or the PROMUX TCP Module is setup with wrong IP address. To change the IP address of the PROMUX TCP Module back to the default address, open the PROMUX TCP Module housing and remove the jumper labeled SIP2. Apply power to the PROMUX 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 PROMUX TCP Module address. The PROMUX 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 PROMUX 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.

3.9 Modbus Register Types

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	Access
1	00001	Digital Outputs	Read & Write
2	10001	Digital Inputs	Read Only
3	30001	Input registers (Analog)	Read Only
4	40001	Output registers (Analog)	Read & Write

Note: The Modbus message length must be limited to 100 consecutive read or write registers. If more registers are required then a new poll group must be added for the next xxx registers.

3.10 Modbus Functions

The PROMUX TCP modules will respond to the following Modbus functions:

Function 1 – Read I/O status (Digital Inputs and Outputs)
Function 2 – Read I/O status (Digital Inputs and Outputs)
Function 3 – Read Register (Analog Inputs and Outputs)
Function 4 – Read Register (Analog Inputs and Outputs)
Function 5 – Write Single Digital Output (Digital Outputs)
Function 6 – Write Single Register (Analog Outputs)
Function 15 – Write Multiple Digital Outputs (Digital Outputs)
Function 16 – Write Multiple Registers (Analog Outputs)

4. PROMUX TCP MODULES

4.1 PT16DI - DIGITAL INPUTS WITH COUNTERS

4.1.1 Description

The PT16DI 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 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 PT16DI Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT16DI 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module 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 .

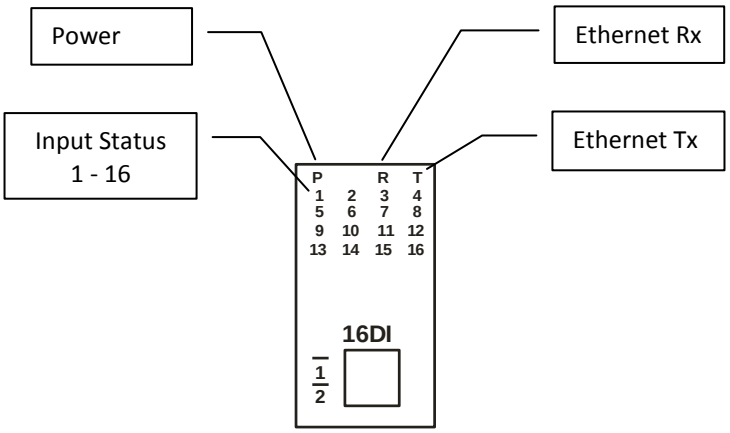
4.1.2 Technical Specification of PT16DI

Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	75mA @ 12V / 39mA @ 24V
Digital Inputs	Input Points	16
	Input Voltage Range	12 - 24 Vdc
	Input Current per input	5mA @ 12Vdc / 11mA @ 24Vdc
	Isolation	1500Vrms between field and logic
Counters (Filter disabled)	Inputs	1 to 16
	Resolution	32 Bits
	Frequency	1KHz (max)
	Pulse Width	500us (min)
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

Note: Inputs 1 to 16 are used as both digital inputs and counter inputs.

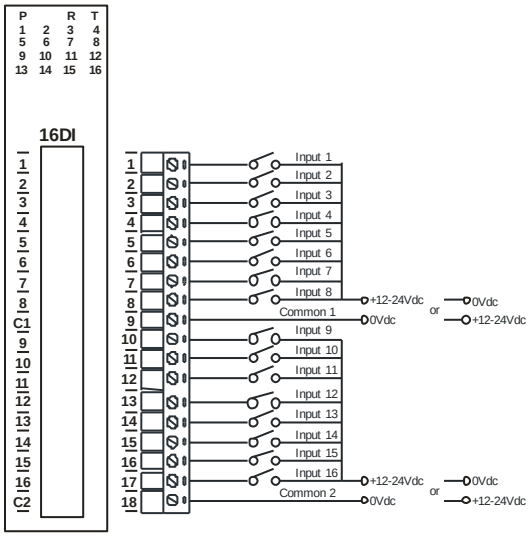
4.1.3 Status Indicators

Power: Flashes to indicate the CPU is running.
Ethernet Rx: Flashes to indicate the unit has received a valid Modbus message.
Ethernet Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "OFF" when the input is off.
"ON" when the input is on.

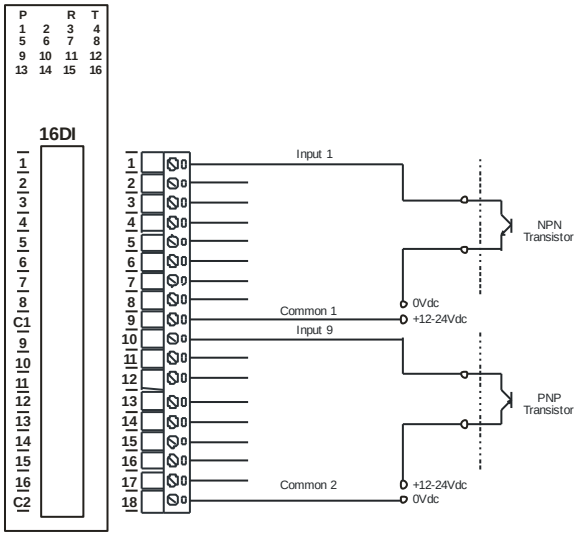


4.1.4 Wiring

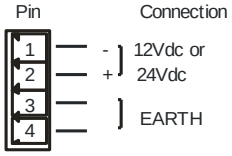
The following diagram shows how the digital inputs are connected to potential free switches. The common can be connected to positive or negative as indicated.



The following diagram shows how the digital inputs are connected a NPN transistor or a PNP transistor.

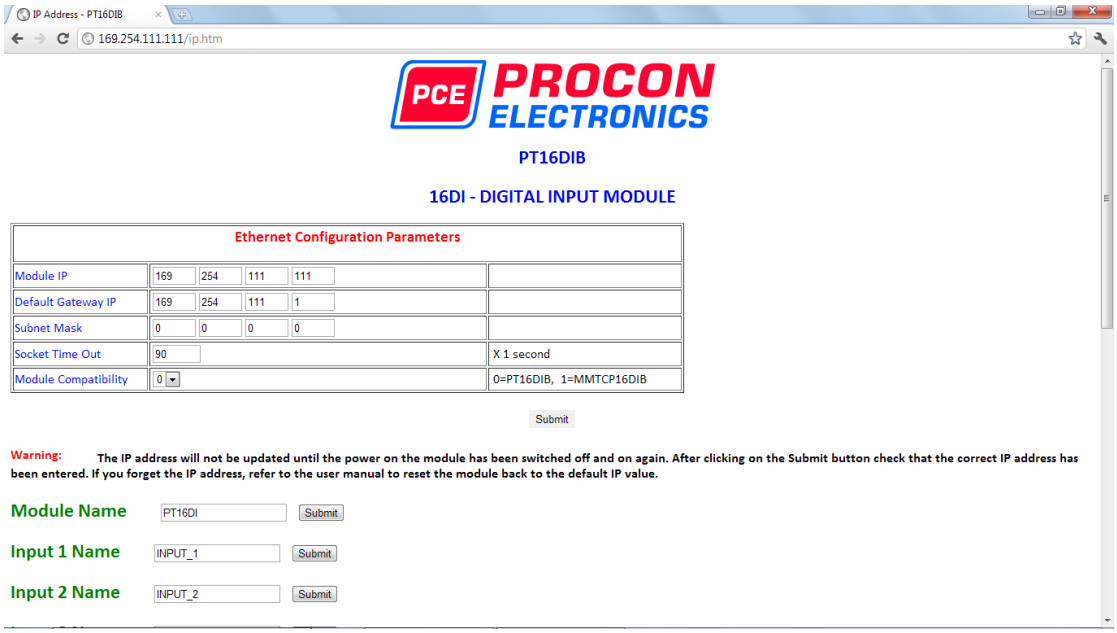


The following diagram shows the wiring for the power.



4.1.5 Configuration

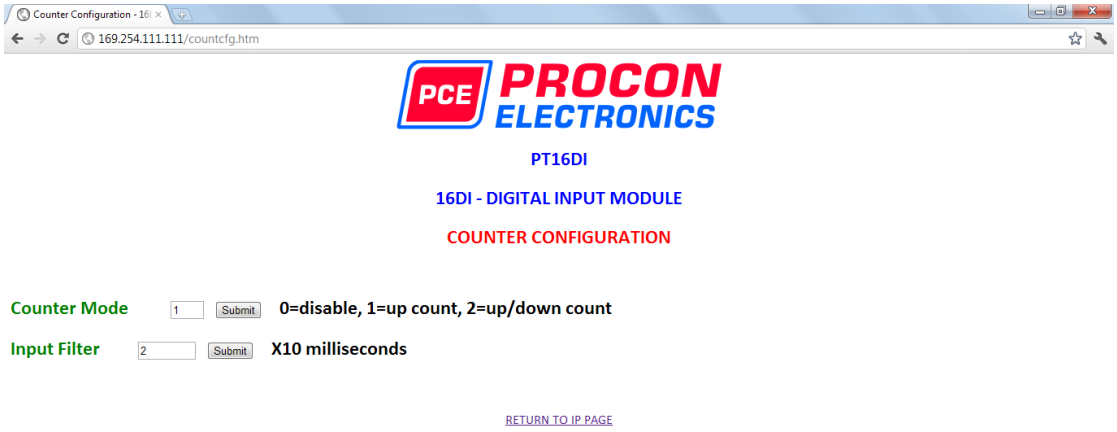
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the PROMUX TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **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 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 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

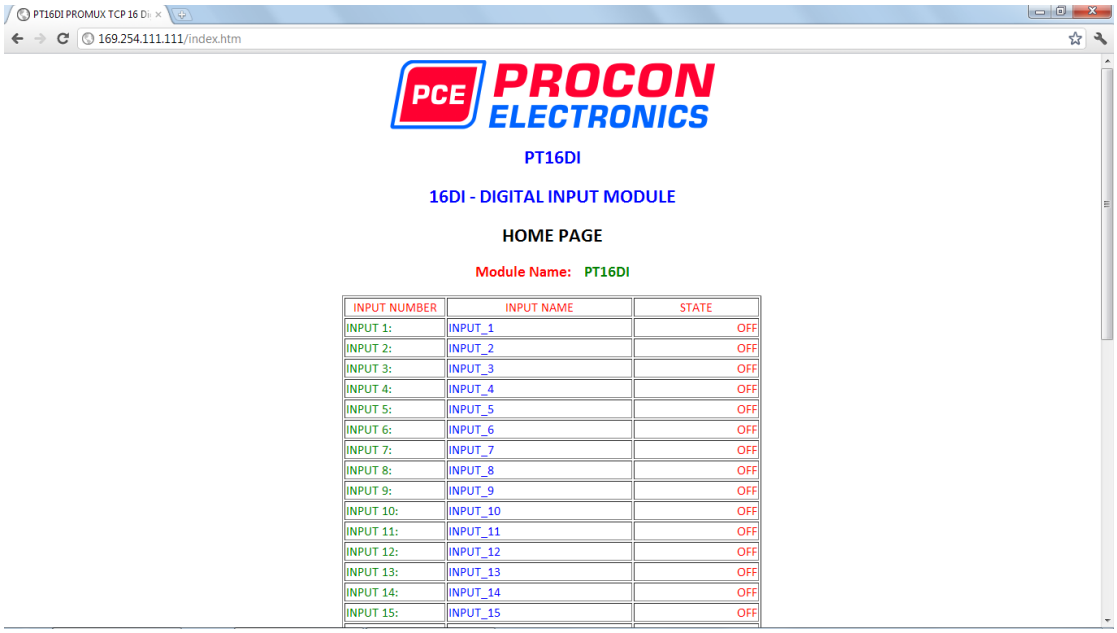
The Web page address "**169.254.111.111/countcfg.htm**" is entered into the address line of the browser window to access the counter configuration page. This page allows you to edit the Counter Mode and the Input filter.



- **Counter Mode:** Enter 0, 1 or 2 to submit the required mode.
- **Input Filter:** The input filter is used to prevent false inputs and counting due to electrical noise or contact bounce.

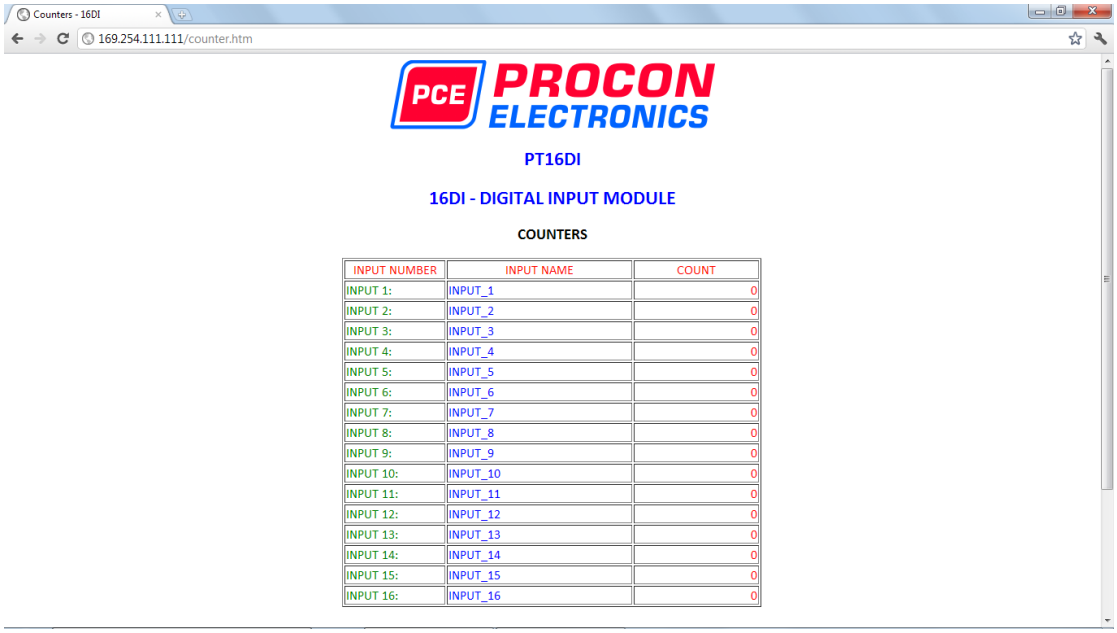
4.1.6 Viewing web pages

To view the default Web page in the PROMUX 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 PROMUX 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.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **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.

4.1.7 PT16DI - DIGITAL INPUTS (MODULE TYPE = 130)

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 = 130
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 9 MSB	0	65535	R/W	"
40020	Counter 9 LSB	0	65535	R/W	"
40021	Counter 10MSB	0	65535	R/W	"
40022	Counter 10LSB	0	65535	R/W	"

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
40023	Counter 11MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40024	Counter 11LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40025	Counter 12MSB	0	65535	R/W	"
40026	Counter 12LSB	0	65535	R/W	"
40027	Counter 13MSB	0	65535	R/W	"
40028	Counter 13LSB	0	65535	R/W	"
40029	Counter 14MSB	0	65535	R/W	"
40030	Counter 14LSB	0	65535	R/W	"
40031	Counter 15MSB	0	65535	R/W	"
40032	Counter 15LSB	0	65535	R/W	"
40033	Counter 16MSB	0	65535	R/W	"
40034	Counter 16LSB	0	65535	R/W	"
40035	Counter Capture	0	65535	R/W	Bit1 = 1 to Capture Counter1, Bit2 = 1 to Capture Counter2, etc.
40036	CCounter 1 MSB	0	65535	R/W	Capture Counter Registers. MSB and LSB
40037	CCounter 1 LSB	0	65535	R/W	combine to give a 32 bit Value.
40038	CCounter 2 MSB	0	65535	R/W	Counter with range 0 to 4294967295.
40039	CCounter 2 LSB	0	65535	R/W	
40040	CCounter 3 MSB	0	65535	R/W	"
40041	CCounter 3 LSB	0	65535	R/W	"
40042	CCounter 4 LSB	0	65535	R/W	"
40043	CCounter 4 LSB	0	65535	R/W	"
40044	CCounter 5 MSB	0	65535	R/W	"
40045	CCounter 5 LSB	0	65535	R/W	"
40046	CCounter 6 MSB	0	65535	R/W	"
40047	CCounter 6 LSB	0	65535	R/W	"
40048	CCounter 7 MSB	0	65535	R/W	"
40049	CCounter 7 LSB	0	65535	R/W	"
40050	CCounter 8 MSB	0	65535	R/W	"
40051	CCounter 8 LSB	0	65535	R/W	"
40052	CCounter 9 MSB	0	65535	R/W	"
40053	CCounter 9 LSB	0	65535	R/W	"
40054	CCounter 10MSB	0	65535	R/W	"
40055	CCounter 10LSB	0	65535	R/W	"
40056	CCounter 11MSB	0	65535	R/W	"
40057	CCounter 11LSB	0	65535	R/W	"
40058	CCounter 12MSB	0	65535	R/W	"
40059	CCounter 12LSB	0	65535	R/W	"
40060	CCounter 13MSB	0	65535	R/W	"
40061	CCounter 13LSB	0	65535	R/W	"
40062	CCounter 14MSB	0	65535	R/W	"
40063	CCounter 14LSB	0	65535	R/W	"

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
40064	CCounter 15MSB	0	65535	R/W	"
40065	CCounter 15LSB	0	65535	R/W	"
40066	CCounter 16MSB	0	65535	R/W	"
40067	CCounter 16LSB	0	65535	R/W	"
40101	Counter Mode	0	2	R/W	0=Disable, 1=Up Counting, 2=Up/Down Count
40102	Input Filter	0	65535	R/W	0 = Disable, >0 = Enable. (x10ms)
40103	Capture Zero	0	65535	R/W	0 = Disabled, bit1 = auto zero counter 1.

4.1.7.1 Digital Input Register.

The digital inputs can be read in a single register as follows:

MSB					**PT16DI DIGITAL INPUTS**										LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30002

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Digital Input Number

4.1.7.2 Counter Registers.

The counters are stored as two 16 bit registers. The first register is the High Register and the second register is the Low Register. To get the actual 32 bit count value the registers must be combined as follows:

Counter High Value = Register 40003.
Counter Low Value = Register 40004.

Counter Value = (Counter High Value X 65535) + Counter Low Value.

4.1.7.3 Counter Capture.

To capture a counter a 1 must be written to the corresponding bit position in the Counter Capture Register 40035. For example:

1. Writing 1 to Register 40035 results in Counter 1 value being captured to Counter Capture 1.
2. Writing 2 to Register 40035 results in Counter 2 value being captured to Counter Capture 2.
3. Writing 3 to Register 40035 results in Counter 1 value being captured to Counter Capture 1 and Counter 2 value being captured to Counter Capture 2.

Once the module has Captured the counters, the Counter Capture Register 40035 is cleared to zero. It is possible to read this register to get confirmation that the capture is complete before reading the captured counter values.

4.1.7.4 Counter Auto Zero.

The counter being captured can be auto zeroed. The purpose of this function is to let the module zero the counter so that no counts get lost due to delays from communication latency, etc.

To ensure that a counter is auto zeroed, a 1 must be written to the corresponding bit position in the Capture Zero Register 40103. For example:

Writing 1 to Register 40103 results in Counter 1 value being zeroed when the Counter Capture bit is 1.

The value in the Capture Zero Register 40103 is permanently stored in memory and only has to be configured once.

4.2 PT16DIB - DIGITAL INPUTS WITH COUNTERS

4.2.1 DESCRIPTION

The PT16DIB 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 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, etc.

When the input filter is configured for > 10ms (Input Filter > 1), the 16 counters are saved in non-volatile memory and the count value will be saved when power fails.

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 PT16DIB Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT16DIB 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module 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 .

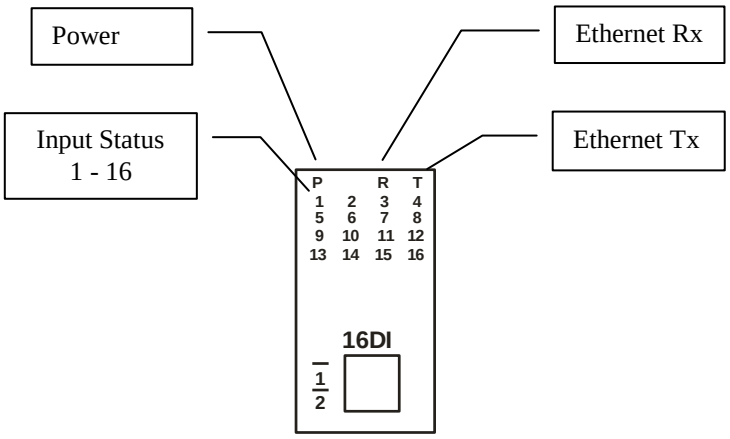
4.2.2 Technical Specification of PT16DIB

Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	75mA @ 12V / 39mA @ 24V
Digital Inputs	Input Points	16
	Input Voltage Range	12 - 24 Vdc
	Input Current per input	5mA @ 12Vdc / 11mA @ 24Vdc
	Isolation	1500Vrms between field and logic
Counters (Filter disabled)	Inputs	1 to 16
	Resolution	32 Bits
	Frequency	1KHz (max)
	Pulse Width	500us (min)
Counters (Filter > 1)	Inputs	1 to 16
	Resolution	32 Bits
	Frequency	25Hz (max)
	Pulse Width	20ms (min)
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

Note: Inputs 1 to 16 are used as both digital inputs and counter inputs.

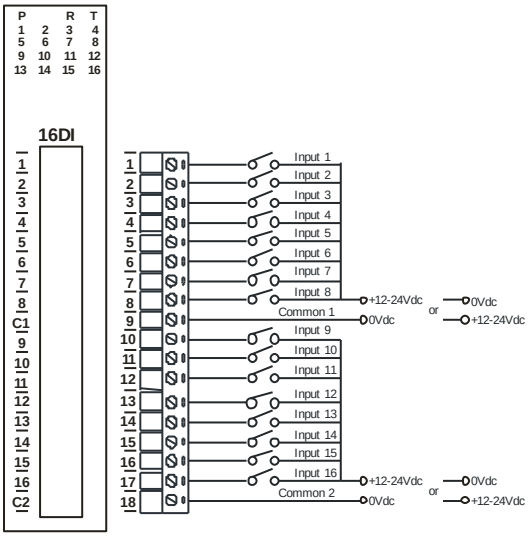
4.2.3 Status Indicators

Power: Flashes to indicate the CPU is running.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "OFF" when the input is off.
"ON" when the input is on.

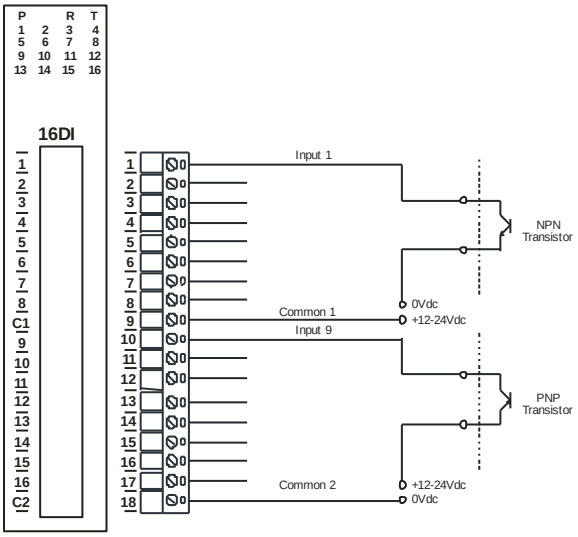


4.2.4 Wiring

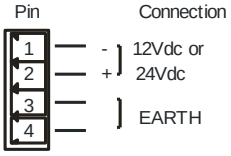
The following diagram shows how the digital inputs are connected to potential free switches. The common can be connected to positive or negative as indicated.



The following diagram shows how the digital inputs are connected a NPN transistor or a PNP transistor.

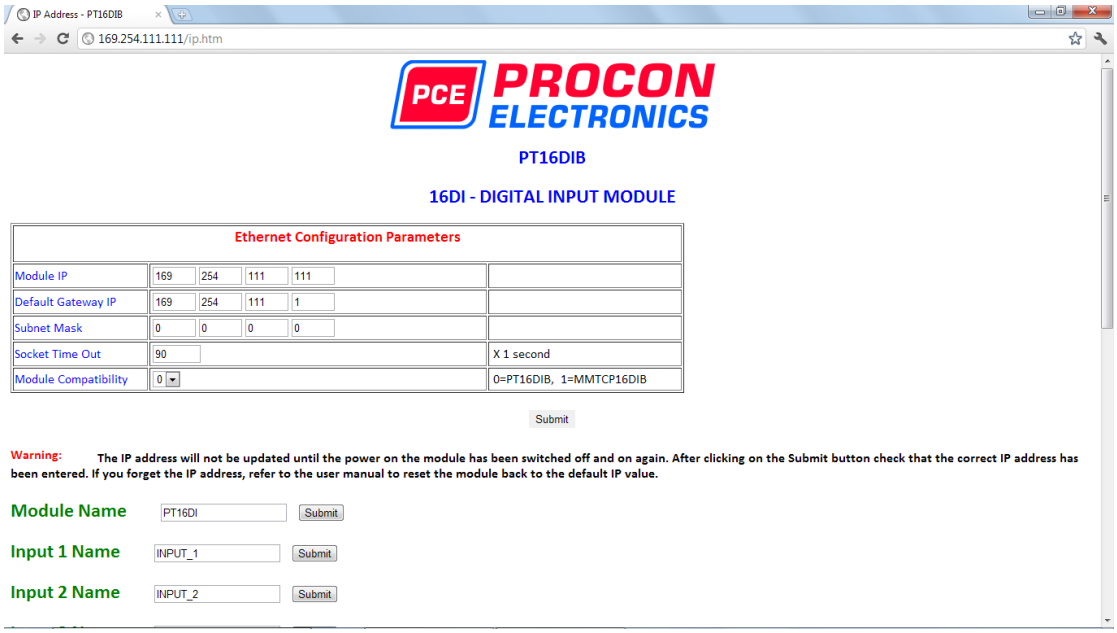


The following diagram shows the wiring for the power.



4.2.5 Configuration

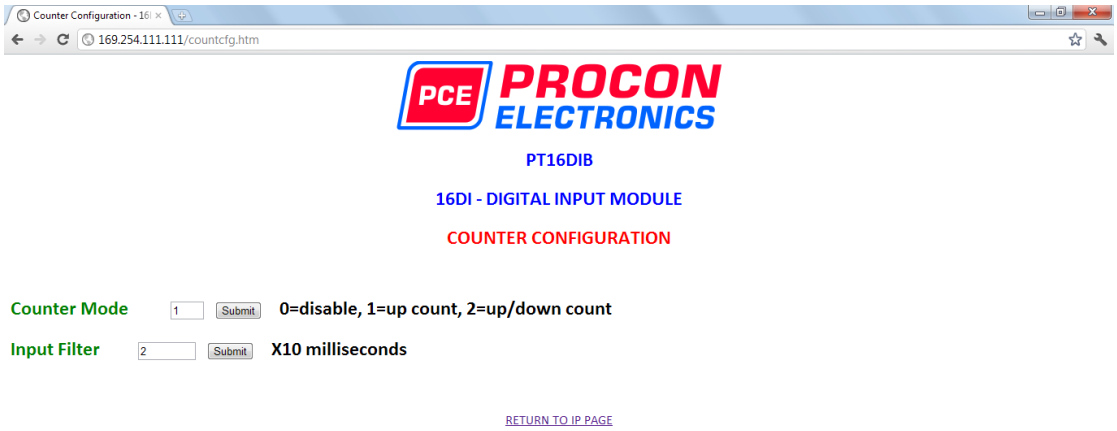
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the MOD-MUX TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **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 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 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

- **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.

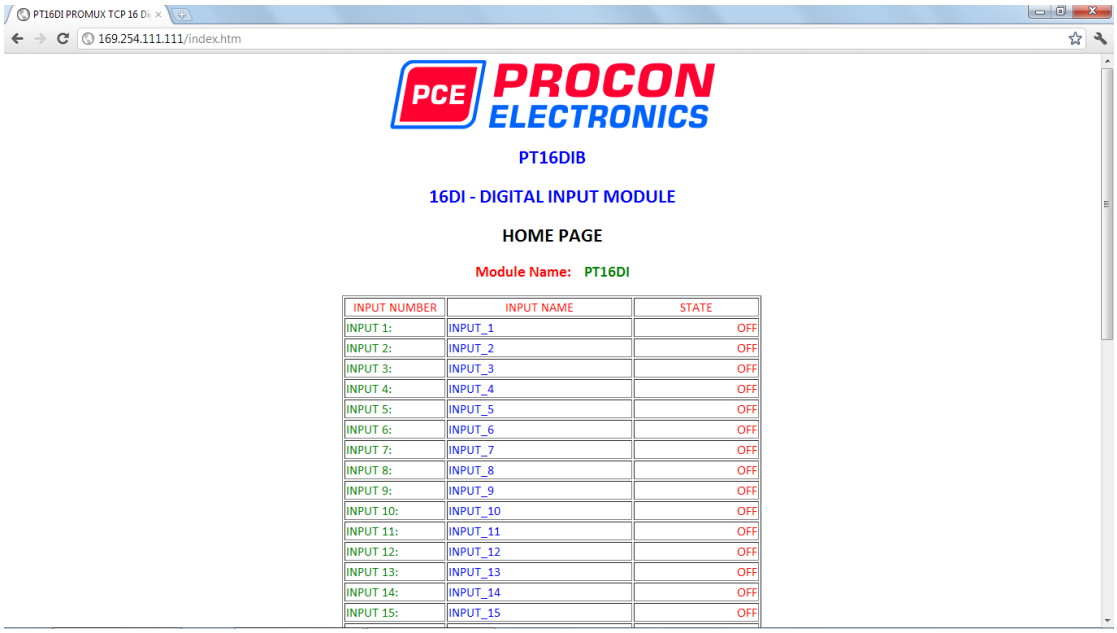
The Web page address "**169.254.111.111/countcfg.htm**" is entered into the address line of the browser window to access the counter configuration page. This page allows you to enter a Counter Description Name for identification/maintenance purposes.



- **Counter Mode:** Enter 0, 1 or 2 to submit the required mode.
- **Input Filter:** The input filter is used to prevent false inputs and counting due to electrical noise or contact bounce.

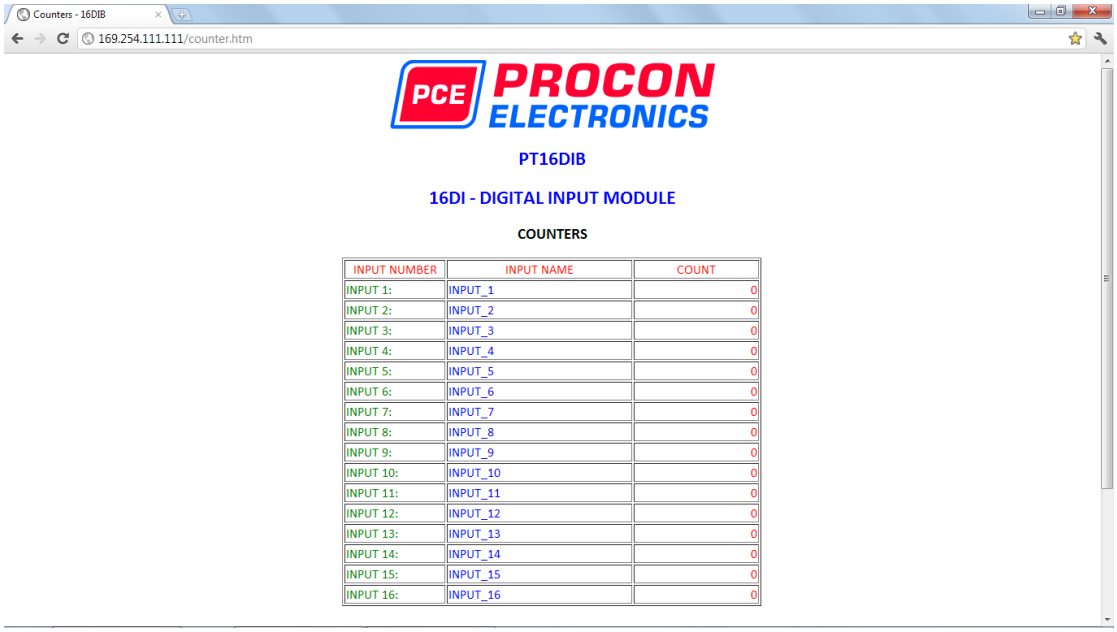
4.2.6 Viewing web pages

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.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **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.

4.2.7 PT16DIB - DIGITAL INPUTS (MODULE TYPE = 148)

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
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 = 148
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 9 MSB	0	65535	R/W	"
40020	Counter 9 LSB	0	65535	R/W	"
40021	Counter 10MSB	0	65535	R/W	"
40022	Counter 10LSB	0	65535	R/W	"

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
40023	Counter 11MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40024	Counter 11LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40025	Counter 12MSB	0	65535	R/W	"
40026	Counter 12LSB	0	65535	R/W	"
40027	Counter 13MSB	0	65535	R/W	"
40028	Counter 13LSB	0	65535	R/W	"
40029	Counter 14MSB	0	65535	R/W	"
40030	Counter 14LSB	0	65535	R/W	"
40031	Counter 15MSB	0	65535	R/W	"
40032	Counter 15LSB	0	65535	R/W	"
40033	Counter 16MSB	0	65535	R/W	"
40034	Counter 16LSB	0	65535	R/W	"
40035	Counter Capture	0	65535	R/W	Bit1 = 1 to Capture Counter1, Bit2 = 1 to Capture Counter2, etc.
40036	CCounter 1 MSB	0	65535	R/W	Capture Counter Registers. MSB and LSB
40037	CCounter 1 LSB	0	65535	R/W	combine to give a 32 bit Value.
40038	CCounter 2 MSB	0	65535	R/W	Counter with range 0 to 4294967295.
40039	CCounter 2 LSB	0	65535	R/W	
40040	CCounter 3 MSB	0	65535	R/W	"
40041	CCounter 3 LSB	0	65535	R/W	"
40042	CCounter 4 LSB	0	65535	R/W	"
40043	CCounter 4 LSB	0	65535	R/W	"
40044	CCounter 5 MSB	0	65535	R/W	"
40045	CCounter 5 LSB	0	65535	R/W	"
40046	CCounter 6 MSB	0	65535	R/W	"
40047	CCounter 6 LSB	0	65535	R/W	"
40048	CCounter 7 MSB	0	65535	R/W	"
40049	CCounter 7 LSB	0	65535	R/W	"
40050	CCounter 8 MSB	0	65535	R/W	"
40051	CCounter 8 LSB	0	65535	R/W	"
40052	CCounter 9 MSB	0	65535	R/W	"
40053	CCounter 9 LSB	0	65535	R/W	"
40054	CCounter 10MSB	0	65535	R/W	"
40055	CCounter 10LSB	0	65535	R/W	"
40056	CCounter 11MSB	0	65535	R/W	"
40057	CCounter 11LSB	0	65535	R/W	"
40058	CCounter 12MSB	0	65535	R/W	"
40059	CCounter 12LSB	0	65535	R/W	"
40060	CCounter 13MSB	0	65535	R/W	"
40061	CCounter 13LSB	0	65535	R/W	"
40062	CCounter 14MSB	0	65535	R/W	"
40063	CCounter 14LSB	0	65535	R/W	"

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
40064	CCounter 15MSB	0	65535	R/W	"
40065	CCounter 15LSB	0	65535	R/W	"
40066	CCounter 16MSB	0	65535	R/W	"
40067	CCounter 16LSB	0	65535	R/W	"
40101	Counter Mode	0	2	R/W	0=Disable, 1=Up Counting, 2=Up/Down Count
40102	Input Filter	0	65535	R/W	0 = Disable, >0 = Enable. (x10ms)
40103	Capture Zero	0	65535	R/W	0 = Disabled, bit1 = auto zero counter 1.

4.2.7.1 Digital Input Register.

The digital inputs can be read in a single register as follows:

MSB					**PT16DIB DIGITAL INPUTS**										LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30002

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Digital Input Number

4.2.7.2 Counter Registers.

The counters are stored as two 16 bit registers. The first register is the High Register and the second register is the Low Register. To get the actual 32 bit count value the registers must be combined as follows:

Counter High Value = Register 40003.
Counter Low Value = Register 40004.

Counter Value = (Counter High Value X 65535) + Counter Low Value.

4.2.7.3 Counter Capture.

To capture a counter a 1 must be written to the corresponding bit position in the Counter Capture Register 40035. For example:

4. Writing 1 to Register 40035 results in Counter 1 value being captured to Counter Capture 1.
5. Writing 2 to Register 40035 results in Counter 2 value being captured to Counter Capture 2.
6. Writing 3 to Register 40035 results in Counter 1 value being captured to Counter Capture 1 and Counter 2 value being captured to Counter Capture 2.

Once the module has Captured the counters, the Counter Capture Register 40035 is cleared to zero. It is possible to read this register to get confirmation that the capture is complete before reading the captured counter values.

4.2.7.4 Counter Auto Zero.

The counter being captured can be auto zeroed. The purpose of this function is to let the module zero the counter so that no counts get lost due to delays from communication latency, etc.

To ensure that a counter is auto zeroed, a 1 must be written to the corresponding bit position in the Capture Zero Register 40103. For example:

Writing 1 to Register 40103 results in Counter 1 value being zeroed when the Counter Capture bit is 1.

The value in the Capture Zero Register 40103 is permanently stored in memory and only has to be configured once.

4.3 PT16DO - 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 PT16DO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT16DO 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

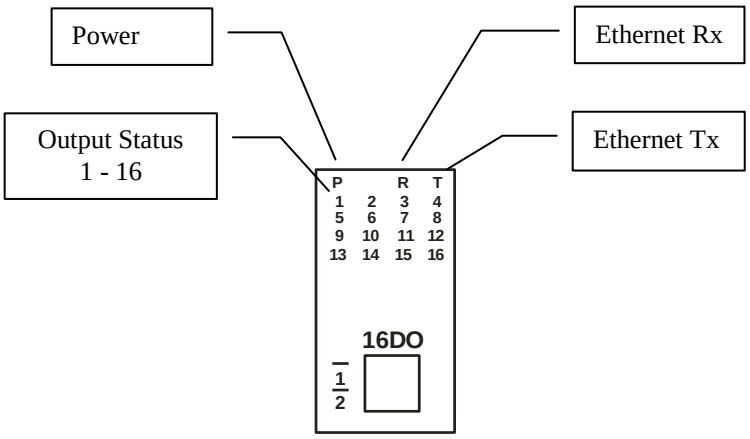
The web page address for viewing the digital output status parameters is http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.3.2 Technical Specification of PT16DO

Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	75mA @ 12V / 39mA @ 24V
	Field Supply Voltage	12 -24 Vdc
	Field Supply Current	6mA @ 12V / 6mA @ 24V
Digital Outputs	Output Points	16
	Maximum Voltage	36 Vdc
	Maximum Current	100 mA per output
	Vceon	1.1V Max.
	Isolation	1500Vrms between field and logic
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

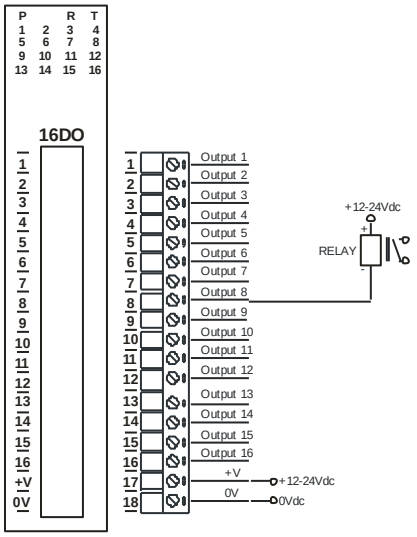
4.3.3 Status Indicators

Power: Flashes to indicate the CPU is running.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
Output Status: "OFF" when the output is off.
"ON" when the output is on.

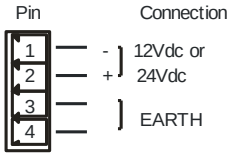


4.3.4 Wiring

The following diagram shows how the digital outputs are connected to the coil of a relay. The coil is connected to positive and switched to negative.

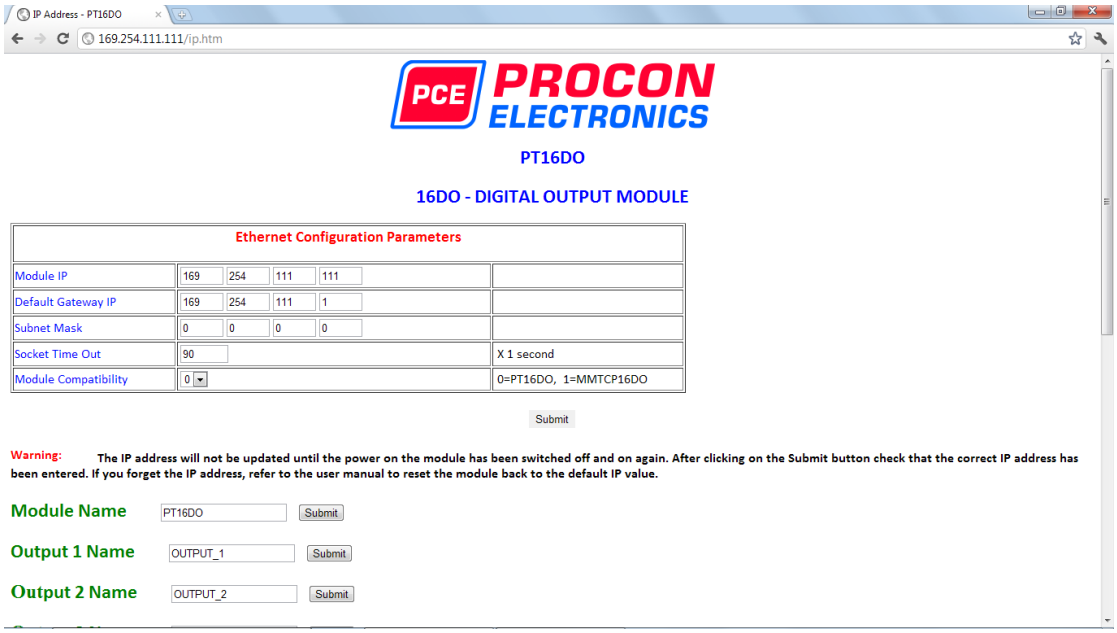


The following diagram shows the wiring for the power.



4.3.5 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 PROMUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.

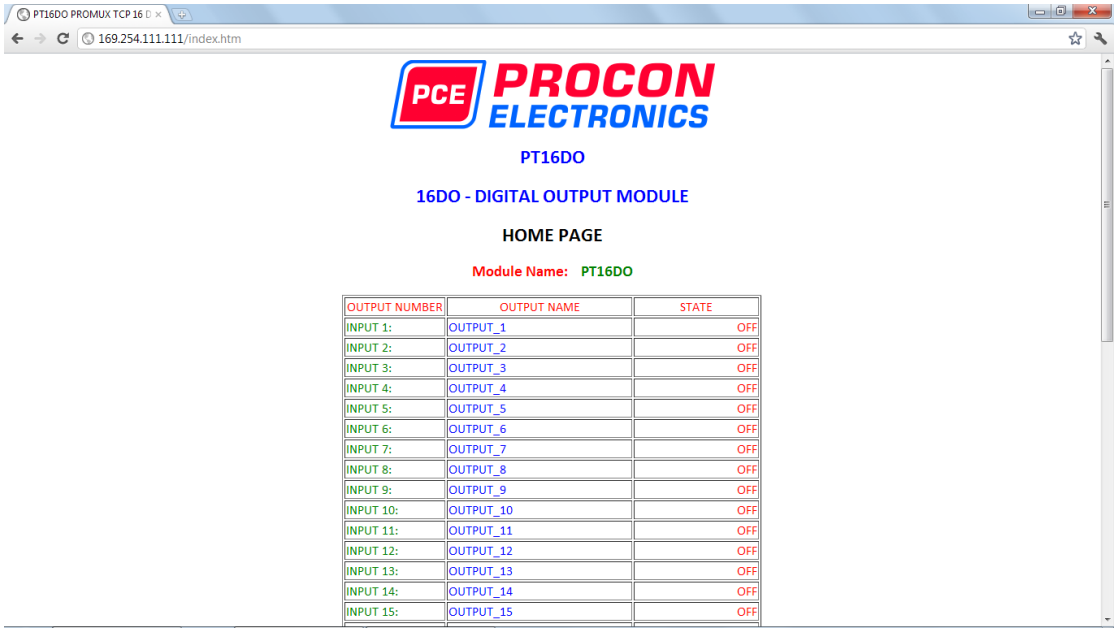


- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

4.3.6 Viewing web pages

To view the default Web page in the PROMUX 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.

4.3.7 PT16DO Data Registers (MODULE TYPE = 131)

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 Output 14	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 = 131
40002	Digital Outputs	N/A	N/A	R/W	Digital Outputs in bits. 16(msb) – 1(lsb).
40101	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 - 255 = enabled.

4.3.7.1 Digital Output Register.

The digital outputs can be read/written in a single register as follows:

MSB					PT16DO DIGITAL OUTPUTS											LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1		40002

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Digital Output

4.3.7.2 Output Watchdog Timer.

The watchdog timer is used to switch off all of the outputs in the event of a communications failure. When set to zero (register 40101) the watchdog timer is disabled.

4.4 PT4RO - RELAY OUTPUTS

4.4.1 Description

The PT4RO module has 4 normally open/ normally closed relay outputs. These modules may be used when a higher drive capability is required, or when isolation between outputs are 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 PT4RO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT4RO 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

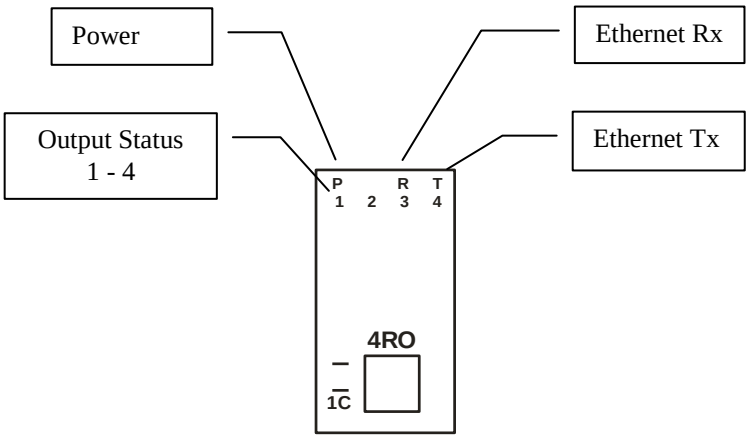
The web page address for viewing the digital output status parameters is
http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.4.2 Technical Specification of PT4RO

Power Supply	Logic Supply Voltage	24 Vdc
	Logic Supply Current	75 mA
Relay Outputs	Output Points	4
	Maximum Current	1A @ 220VAC / 2A @ 24VDC
	Isolation	4000Vrms between field and logic 1000Vrms between outputs
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

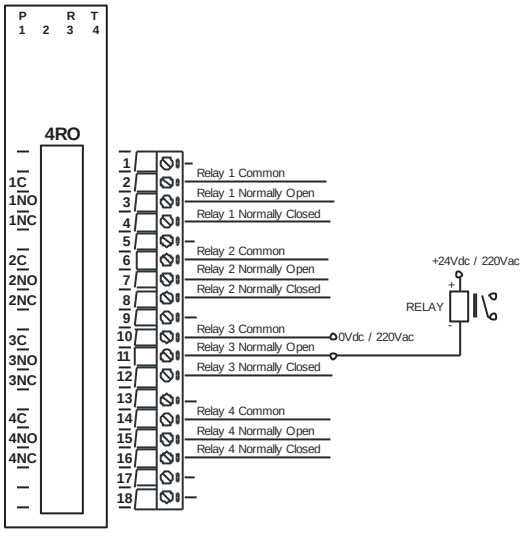
4.4.3 Status Indicators

Power: Flashes to indicate the CPU is running.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
Output Status: "OFF" when the output is off
"ON" when the output is on.

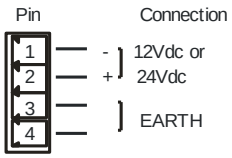


4.4.4 Wiring

The following diagram shows how the relay outputs are connected to the coil of a relay. The coil is connected to positive and switched to negative.

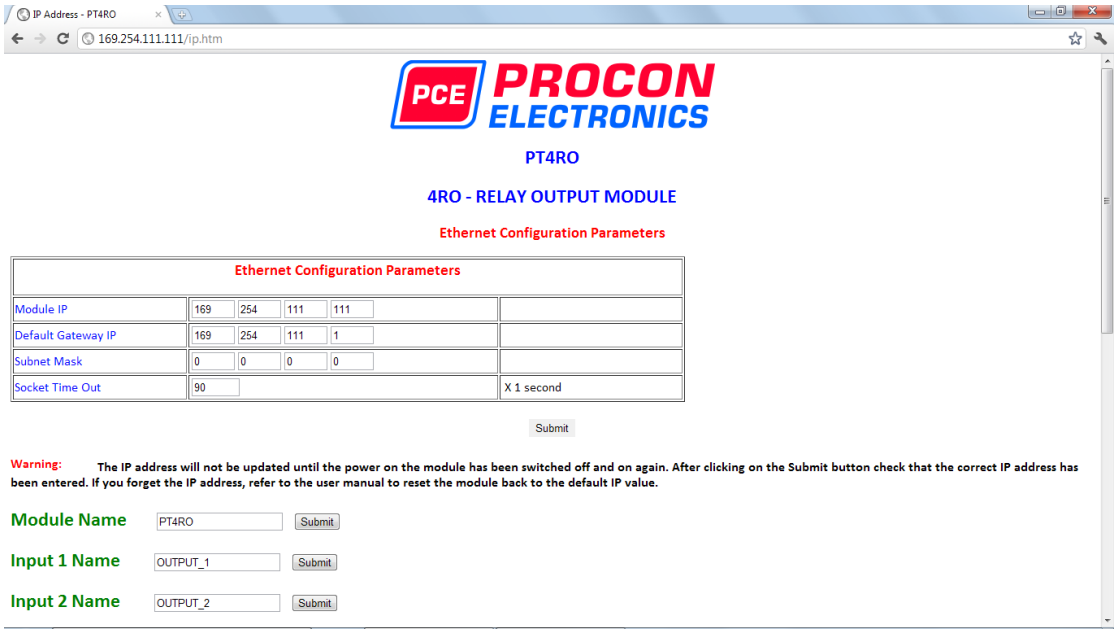


The following diagram shows the wiring for the power.



4.4.5 Configuration

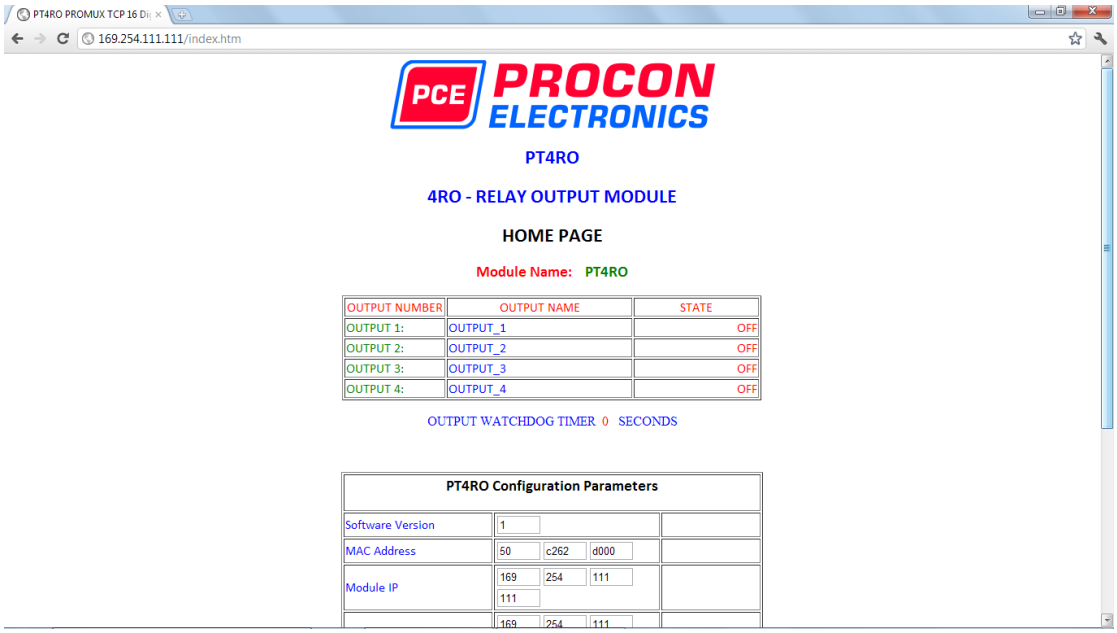
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the PROMUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.



- **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 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 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to “0.0.0.0” then it is effectively disabled and the default gateway is not used. A typical subnet mask would be “255.255.255.0”.
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Name:** This field allows you to enter a module description name into the PROMUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the PROMUX TCP Module in the system by name or number.
- **Output Names:** These fields allow you to enter an output description name into the PROMUX TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular output by name or number.

4.4.6 Viewing web pages

To view the default Web page in the PROMUX 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.

4.4.7 PT4RO Data Registers (MODULE TYPE = 142)

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
00001	Relay Output 1	0	1	R/W	Status of Digital Outputs.
00002	Relay Output 2	0	1	R/W	"
00003	Relay Output 3	0	1	R/W	"
00004	Relay Output 4	0	1	R/W	"
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 142
40002	Digital Outputs	N/A	N/A	R/W	Digital Outputs in bits. xxxx xxxx xxxx 4,3,2,1 bit4(msb) – bit1(lsb).
40101	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 - 255 = enabled.

4.4.7.1 Relay Output Register.

The relay outputs can be read/written in a single register as follows:

MSB								PT4RO DIGITAL OUTPUTS							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	40002

-	-	-	-	-	-	-	-	-	-	-	-	4	3	2	1

Relay Output Number

4.4.7.2 Output Watchdog Timer.

The watchdog timer is used to switch off all of the outputs in the event of a communications failure. When set to zero (register 40101) the watchdog timer is disabled.

4.5 PT8DIO - DIGITAL INPUTS/OUTPUTS WITH COUNTERS

4.5.1 Description

The PT8DIO 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 PT8DIO Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT8DIO 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module 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 .

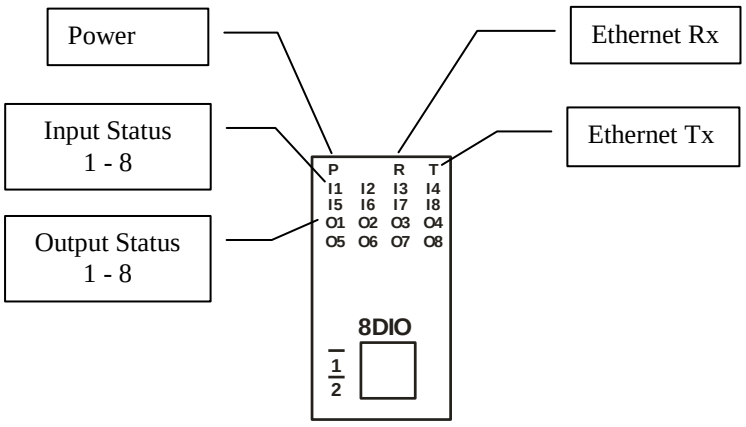
4.5.2 Technical Specification of PT8DIO

Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	75mA @ 12V / 39mA @ 24V
	Field Supply Voltage	12 -24 Vdc
	Field Supply Current	6mA @ 12V / 6mA @ 24V
Digital Inputs	Input Points	8
	Input Voltage Range	12 -24 Vdc
	Input Current per input	5mA@12Vdc / 11mA @24Vdc
	Isolation	1500Vrms between field and logic
Digital Outputs	Output Points	8
	Maximum Voltage	36 Vdc
	Maximum Current	100 mA per output
	Vceon	1.1V Max.
	Isolation	1500Vrms between field and logic
Counters	Inputs	1 to 8
	Resolution	32 Bits
	Frequency	1KHz (max)
	Pulse Width	500us (min)
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

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

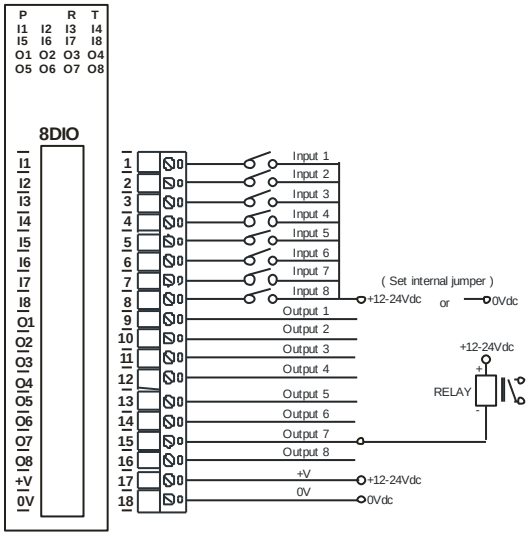
4.5.3 Status Indicators

Power: Flashes to indicate the CPU is running.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "OFF" when the input is off
"ON" when the input is on.
Output Status: "OFF" when the output is off
"ON" when the output is on.

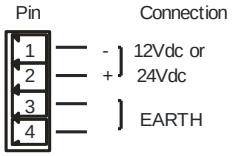


4.5.4 Wiring

The following diagram shows how the digital inputs and outputs are connected.

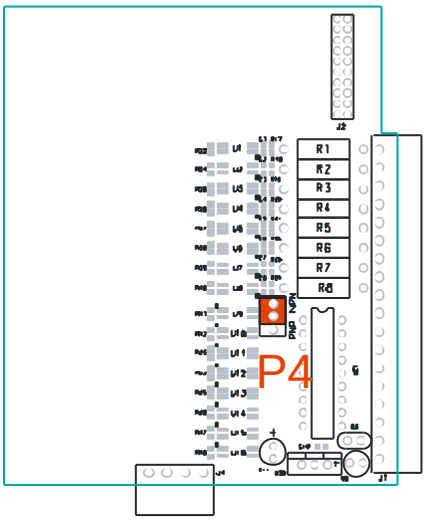


The following diagram shows the wiring for the power.



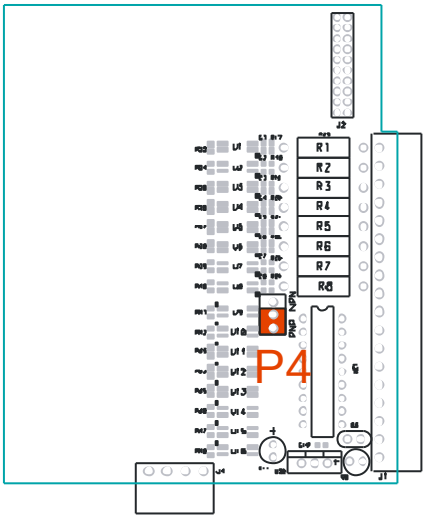
4.5.5 Setting the jumpers for NPN inputs.

The Digital inputs can be configured as NPN inputs. This means that the inputs can be operated by switching to 0V. Change the link **P4** to the NPN position.



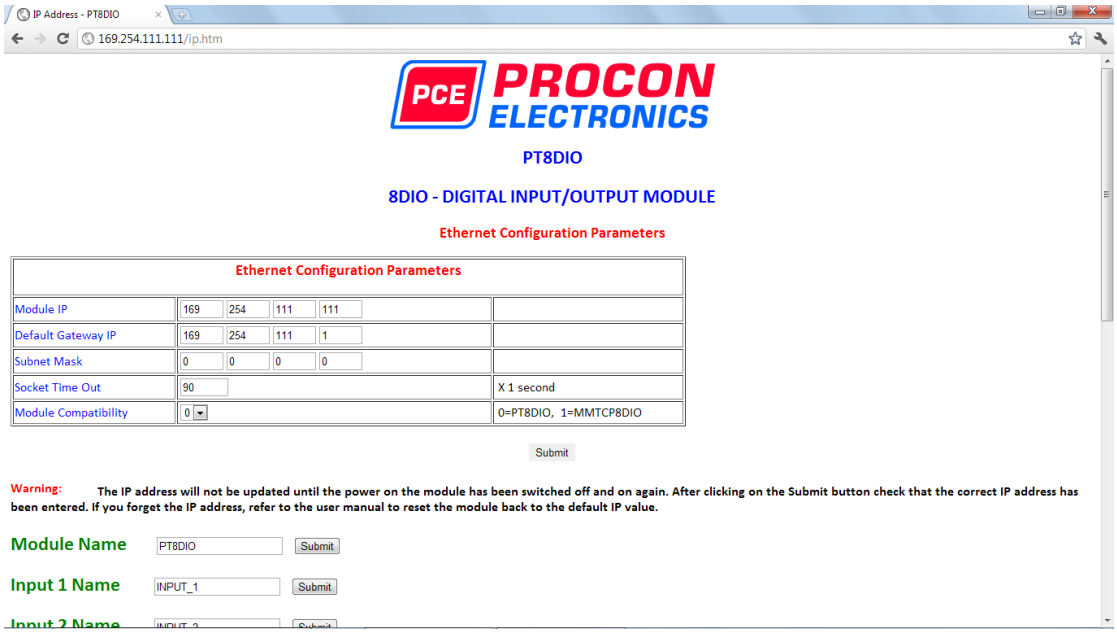
4.5.6 Setting the jumpers for PNP inputs.

The Digital inputs can be configured as PNP inputs. This means that the inputs can be operated by switching to +12V to +24V. Change the link **P4** to the PNP position.



4.5.7 Configuration

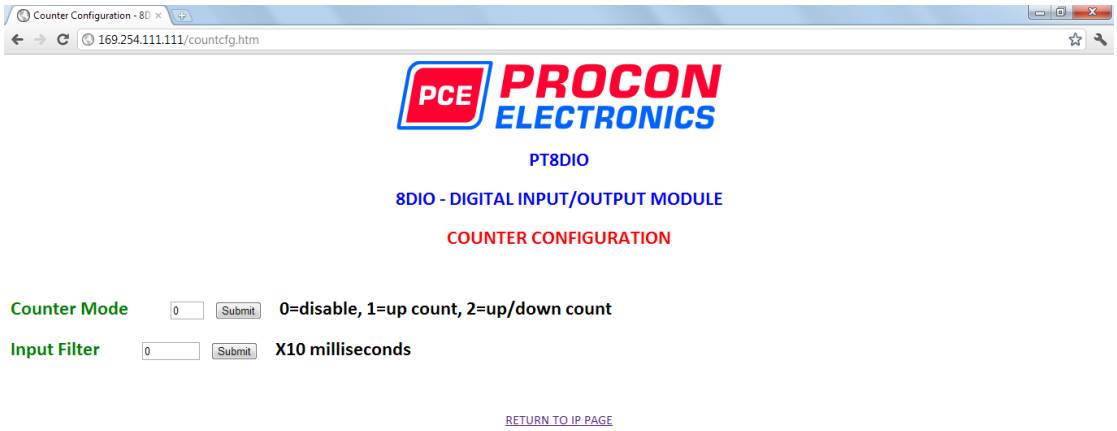
The Web page address "**169.254.111.111/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows you to change the IP address of the PROMUX TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.



- **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 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 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

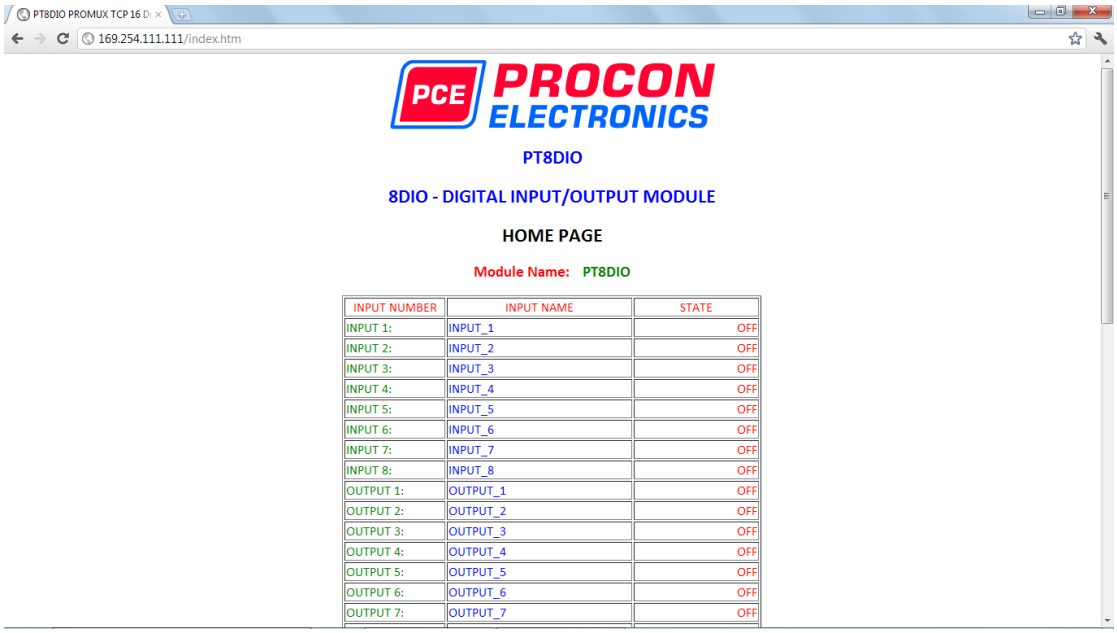
The Web page address "**169.254.111.111/countcfg.htm**" is entered into the address line of the browser window to access the counter configuration page. This page allows you to enter a Counter Description Name for identification/maintenance purposes.



- **Counter Mode:** Enter 0, 1 or 2 to submit the required mode.
- **Input Filter:** The input filter is used to prevent false inputs and counting due to electrical noise or contact bounce.

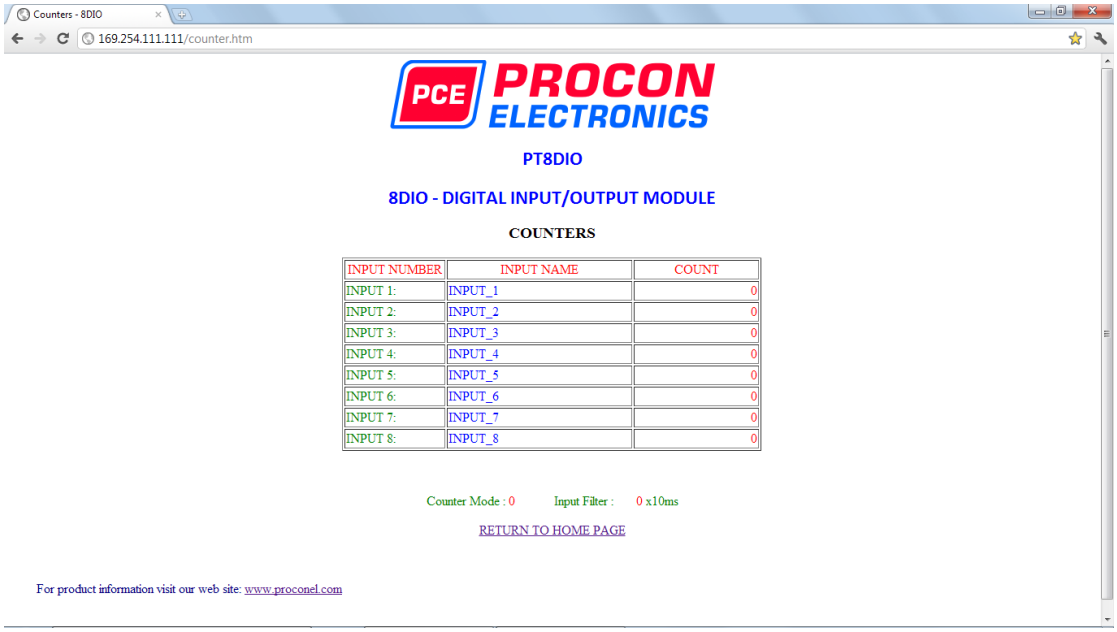
4.5.8 Viewing web pages

To view the default Web page in the PROMUX 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 PROMUX 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.
- **Input Name:** This is the name that was entered in the configuration page to best describe the inputs.
- **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.

4.5.9 PT8DIO Data Registers (MODULE TYPE = 132)

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	"
00017	Digital Output 1	0	1	R/W	Status of Digital Outputs.
00018	Digital Output 2	0	1	R/W	"
00019	Digital Output 3	0	1	R/W	"
00020	Digital Output 4	0	1	R/W	"
00021	Digital Output 5	0	1	R/W	"
00022	Digital Output 6	0	1	R/W	"
00023	Digital Output 7	0	1	R/W	"
00024	Digital Output 8	0	1	R/W	"
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 132
30002	Digital Inputs	N/A	N/A	R	Digital Inputs in lower 8 bits. 8 - 1.
40003	Digital Outputs	N/A	N/A	R/W	Digital Outputs in lower 8 bits. 8 - 1.
40004	Counter 1 MSB	0	65535	R/W	Counter MSB and LSB combine to give a 32 bit
40005	Counter 1 LSB	0	65535	R/W	Counter with range 0 to 4294967295.
40006	Counter 2 MSB	0	65535	R/W	"
40007	Counter 2 LSB	0	65535	R/W	"
40008	Counter 3 MSB	0	65535	R/W	"
40009	Counter 3 LSB	0	65535	R/W	"
40010	Counter 4 LSB	0	65535	R/W	"
40011	Counter 4 LSB	0	65535	R/W	"
40012	Counter 5 MSB	0	65535	R/W	"
40013	Counter 5 LSB	0	65535	R/W	"
40014	Counter 6 MSB	0	65535	R/W	"
40015	Counter 6 LSB	0	65535	R/W	"
40016	Counter 7 MSB	0	65535	R/W	"
40017	Counter 7 LSB	0	65535	R/W	"
40018	Counter 8 MSB	0	65535	R/W	"
40019	Counter 8 LSB	0	65535	R/W	"
40101	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 - 255 = enabled.
40105	Counter Mode	0	2	R/W	0=Disable, 1=Up Counting, 2=Up/Down Count
40106	Input Filter	0	65535	R/W	0 = Disable, >0 = Enable. (x10ms)

4.5.9.1 Digital Input Register.

The digital inputs can be read in a single register as follows:

MSB								PT8DIO DIGITAL INPUTS							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30002

0	0	0	0	0	0	0	0	8	7	6	5	4	3	2	1

Digital Input Number

4.5.9.2 Digital Output Register.

The digital outputs can be read/written in a single register as follows:

MSB								PT8DIO DIGITAL OUTPUTS							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	40003

0	0	0	0	0	0	0	0	8	7	6	5	4	3	2	1

Digital Output Number

4.5.9.3 Counter Registers.

The counters are stored a two 16 bit registers. The first register is the High Register and the second register is the Low Register. To get the actual 32 bit count value the registers must be combined as follows:

Counter High Value = Register 40003.
Counter Low Value = Register 40004.

Counter Value = (Counter High Value X 65535) + Counter Low Value.

4.5.9.4 Output Watchdog Timer.

The watchdog timer is used to switch off all of the outputs in the event of a communications failure. When set to zero (register 40101) the watchdog timer is disabled.

4.6 PT8AIIS –ISOLATED ANALOG CURRENT INPUTS

4.6.1 Description

The PT8AIIS module is an 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 PT8AIIS 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. The module also supports 14 bit and 16 bit ranges.

Each PT8AIIS Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT8AIIS 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

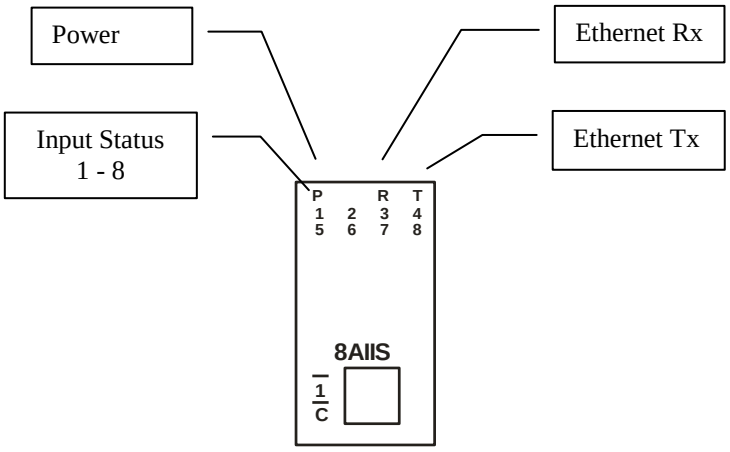
The web page address for viewing the input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.6.2 Technical Specification of PT8AIIS

Power Supply	Logic Supply Voltage		12 -24 Vdc
	Logic Supply Current		105mA @ 12V / 54mA @ 24V
Current Inputs	Input Points		8
	Input Current		0(4) - 20 mA
	InputType	**Range**	**Resolution**
	1	0 – 4095	12 bits
	2	0–20.000mA	1uA
	3	+/-20.000mA	1uA
	4	0 - 16383	14 bits
	5	0 - 65535	16 bits
	Drift		100ppm/°C
	Isolation		1500Vrms between field and logic 350Vpeak between each input
Ethernet	10/100Mbits/s		Twisted pair.
Temperature	Operating Temperature.		-40°C to + 80°C
	Storage Temperature		-40°C to + 85°C
Connectors	Logic Power and Comms.		4 Pin Connector on underside of unit
	Inputs		18 Way screw connector on front
	Ethernet		RJ45 on top side of unit.

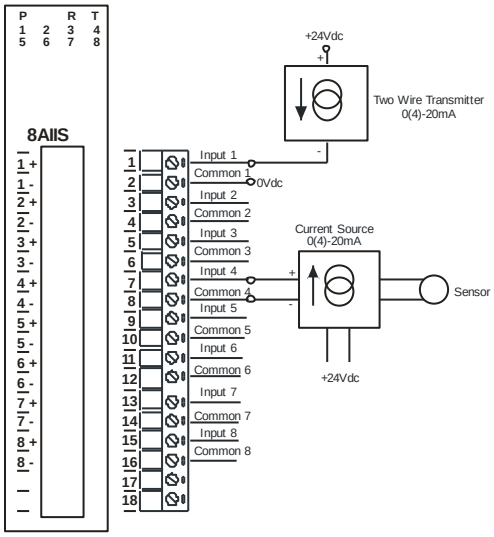
4.6.3 Status Indicators

Power: Flashes to indicate the CPU is running.
Ethernet Rx: Flashes to indicate the unit has received a valid Modbus message.
Ethernet Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "ON" when the input is zero.
"OFF" when the input is greater than zero and less than 20mA.
"Flashing" when the input is over range, greater or equal to 20mA.

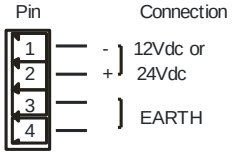


4.6.4 Wiring

The following diagram shows how the analog inputs are connected to a 0(4)-20mA source. All of the common terminals are isolated from each other.

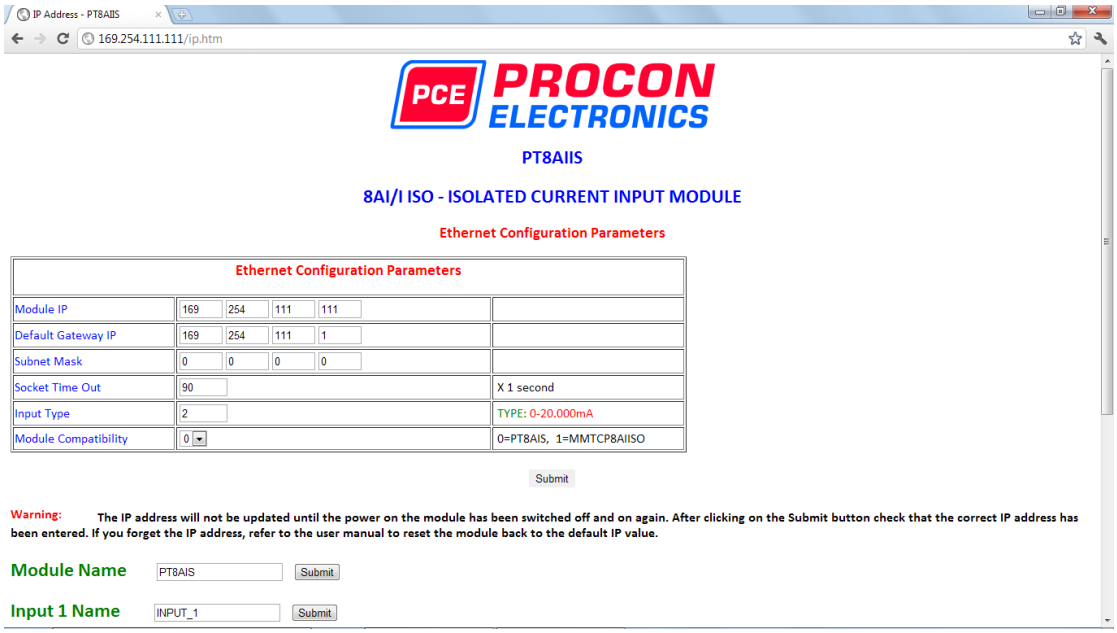


The following diagram shows the wiring for the power.



4.6.5 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 PROMUX TCP Module, select the Input type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



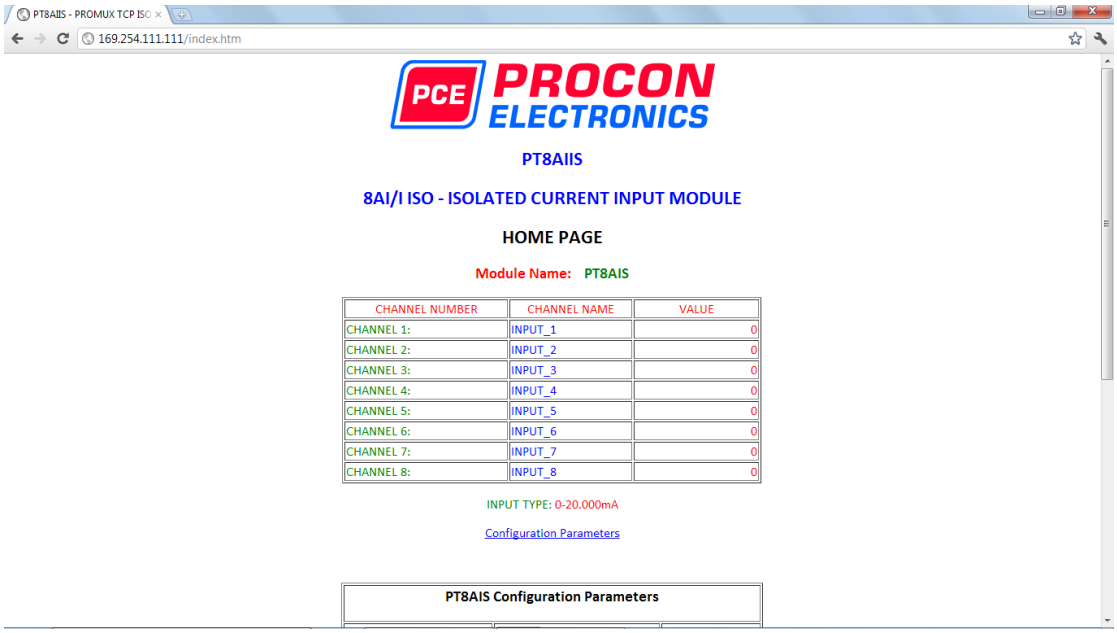
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Input Type:** The type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful

if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

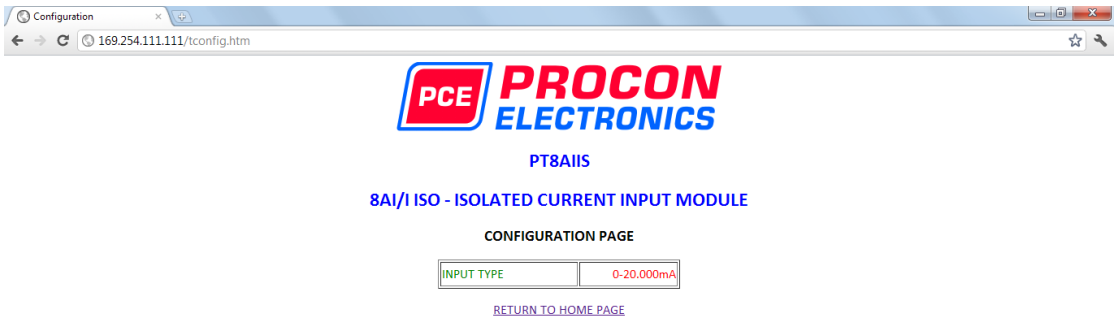
4.6.6 Viewing web pages

To view the default Web page in the PROMUX 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 PROMUX 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.

4.6.7 PT8AIIS Data Registers (MODULE TYPE = 137)

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 137
30002	Analog Input 1	0	65535	R	Analog Input lower 16 Bits
30003	Analog Input 2	0	65535	R	"
30004	Analog Input 3	0	65535	R	"
30005	Analog Input 4	0	65535	R	"
30006	Analog Input 5	0	65535	R	"
30007	Analog Input 6	0	65535	R	"
30008	Analog Input 7	0	65535	R	"
30009	Analog Input 8	0	65535	R	"
30010	Input Status	0	65535	R	bit2 = 0(open circuit or < 2), bit2 = 1(over range) bit1 = 0(OK),bit1 = 1(error)
30011	Input Alarm Status	0	255	R	bit1 = 0(OK),bit1 = 1(input < 2mA)
40101	Input Type	1	5	R/W	See specification table.

4.6.7.1 Analog Input Registers.

The analog inputs are read as a yy bit value in the registers as follows: (yy = 12, 14 or 16 bit)

MSB								**PT8AIIS ANALOG INPUTS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	300XX
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Analog Input: 12 Bit Value (0 - 4095)

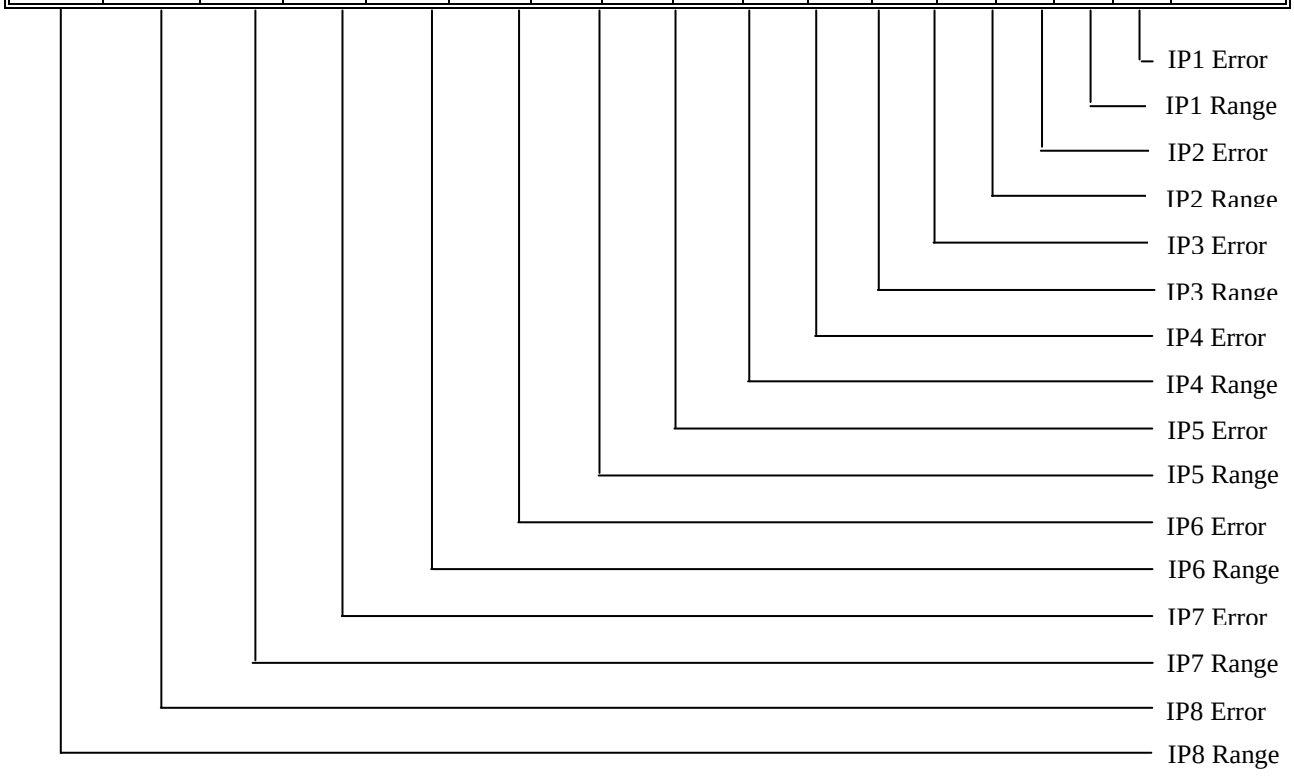
4.6.7.2 Analog Input Status.

There are two status bits associated with each analog input. These bits are used to indicate if the input is zero or open circuit , in the working range 0-20mA, or over range. If the input is open circuit or over range, then the error bit will be set. When the error bit is set, the range bit is zero if the input is open circuit and set if the input is over range, ie:

Bit 1- Error	**Bit 2-Range**	**Condition**	**Status LED**
0	don't care	Input working OK.	(LED OFF)
1	0	Input Open circuit or zero.	(LED ON)
1	1	Input Over range.	(LED FLASH)

The analog input status can be read in a single register as follows:

MSB								**PT8AIIS ANALOG INPUT STATUS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30010

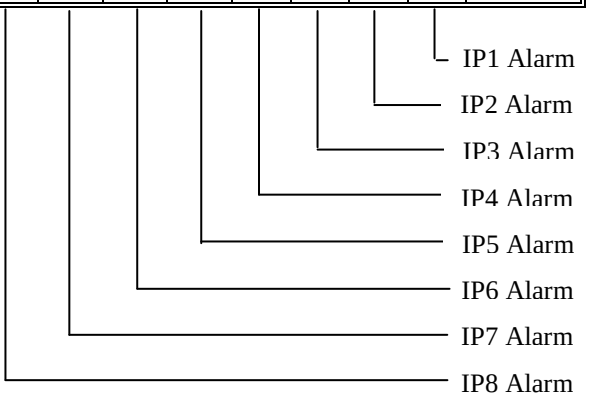


4.6.7.3 Analog Input Alarm Status.

There is one alarm status bit associated with each analog input. The alarm bits are used to indicate if the 4-20mA current loop is broken and the bit will be set if the loop current is less than 2mA.

The analog input alarm status can be read in a single register as follows:

MSB								**PT8AIIS ANALOG INPUT ALARM STATUS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30011



4.7 PT8AIVS - ISOLATED ANALOG VOLTAGE INPUTS

4.7.1 Description

The PT8AIVS module is an 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 PT8AIVS 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. The module also supports 14 bit and 16 bit ranges.

Each PT8AIVS Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT8AIVS 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

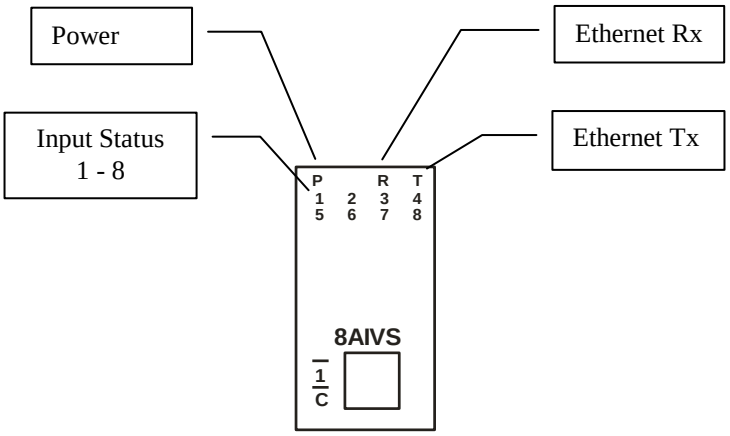
The web page address for viewing the input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.7.2 Technical Specification of PT8AIVS

Power Supply	Logic Supply Voltage		12 -24 Vdc
	Logic Supply Current		105mA @ 12V / 54mA @ 24V
Voltage Inputs	Input Points		8
	Input Voltage		0(2) - 10 Vdc
	InputType	**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
	6	0 - 16383	14 bits
	7	0 - 65535	16 bits
	Drift		100ppm/°C
	Isolation		1500Vrms between field and logic 350Vpeak between each input
Ethernet	10/100Mbits/s		Twisted pair.
Temperature	Operating Temperature.		-40°C to + 80°C
	Storage Temperature		-40°C to + 85°C
Connectors	Logic Power and Comms.		4 Pin Connector on underside of unit
	Inputs		18 Way screw connector on front
	Ethernet		RJ45 on top side of unit.

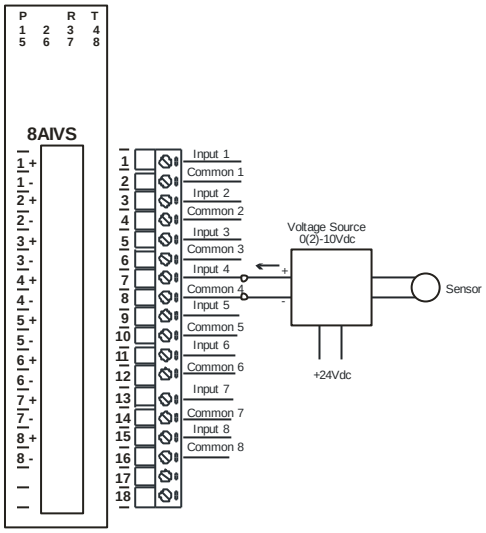
4.7.3 Status Indicators

Power: Flashes to indicate the CPU is running.
Ethernet Rx: Flashes to indicate the unit has received a valid Modbus message.
Ethernet Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "ON" when the input is zero.
"OFF" when the input is greater than zero and less than 10V.
"Flashing" when the input is over range, greater or equal to 10V.

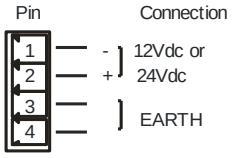


4.7.4 Wiring

The following diagram shows how the analog inputs are connected to a 0(2)-10Vdc source. All of the common terminals are isolated from each other.

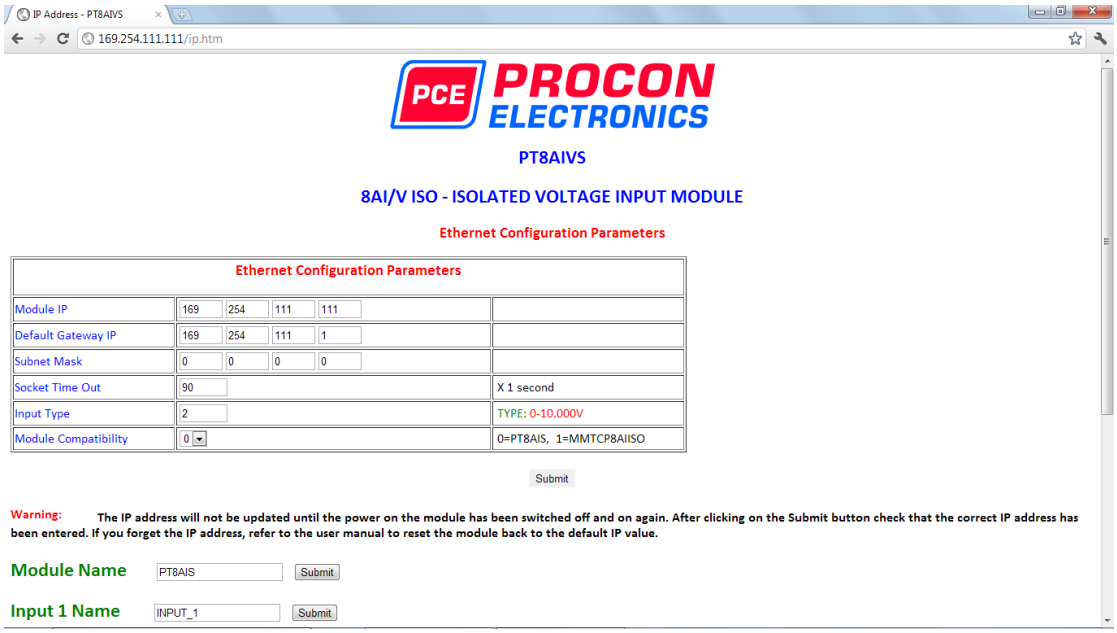


The following diagram shows the wiring for the power.



4.7.5 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 PROMUX TCP Module, select the Input type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



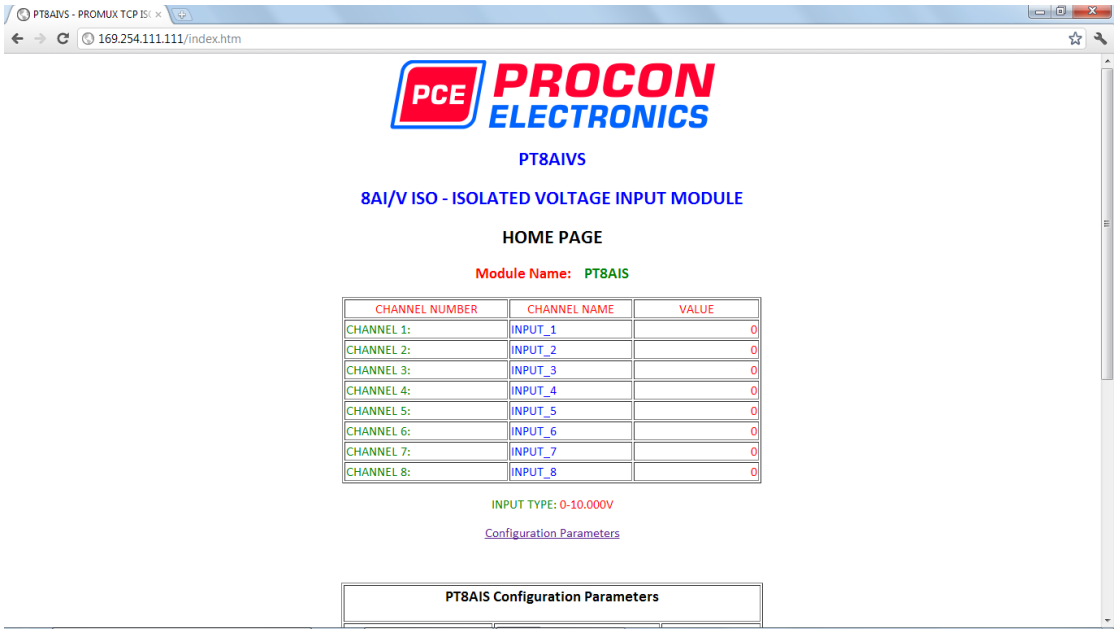
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Input Type:** The type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful

if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

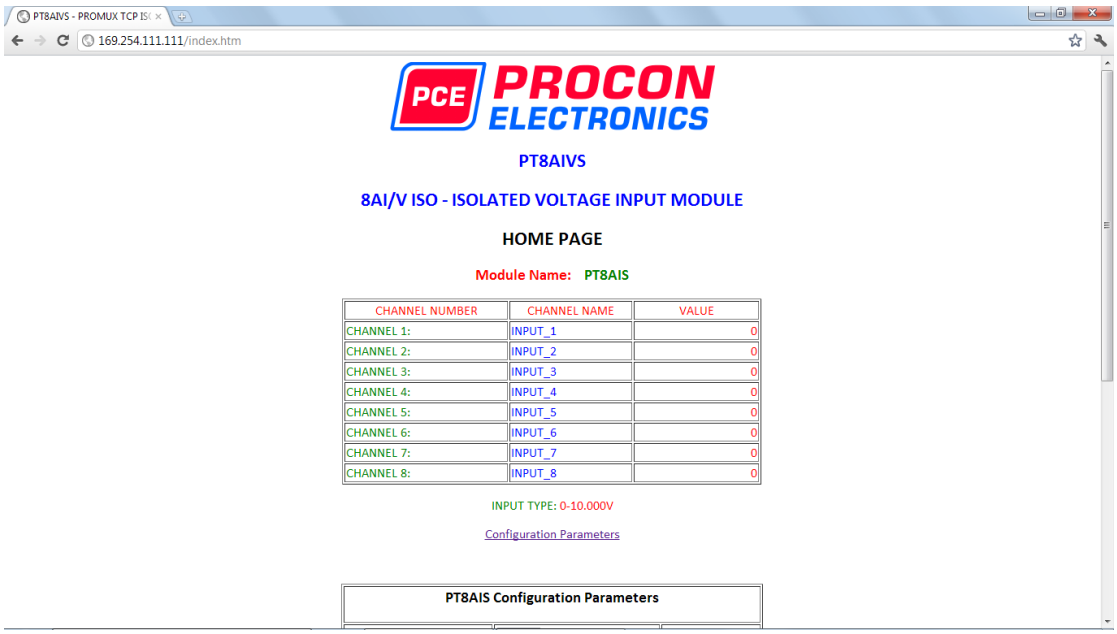
4.7.6 Viewing web pages

To view the default Web page in the PROMUX 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 PROMUX 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.

4.7.7 PT8AIVS Data Registers (MODULE TYPE = 138)

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 138
30002	Analog Input 1	0	65535	R	Analog Input lower 16 Bits
30003	Analog Input 2	0	65535	R	"
30004	Analog Input 3	0	65535	R	"
30005	Analog Input 4	0	65535	R	"
30006	Analog Input 5	0	65535	R	"
30007	Analog Input 6	0	65535	R	"
30008	Analog Input 7	0	65535	R	"
30009	Analog Input 8	0	65535	R	"
30010	Input Status	0	65535	R	bit2 = 0(open circuit or < 2), bit2 = 1(over range) bit1 = 0(OK),bit1 = 1(error)
30011	Input Alarm Status	0	255	R	bit1 = 0(OK),bit1 = 1(input < 1V)
40101	Input Type	1	7	R/W	See specification table.

4.7.7.1 Analog Input Registers.

The analog inputs are read as a yy bit value in the registers as follows: (yy = 12, 14 or 16 bit)

MSB								**PT8AIVS ANALOG INPUTS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	300XX
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

Analog Input: 12 Bit Value (0 - 4095)

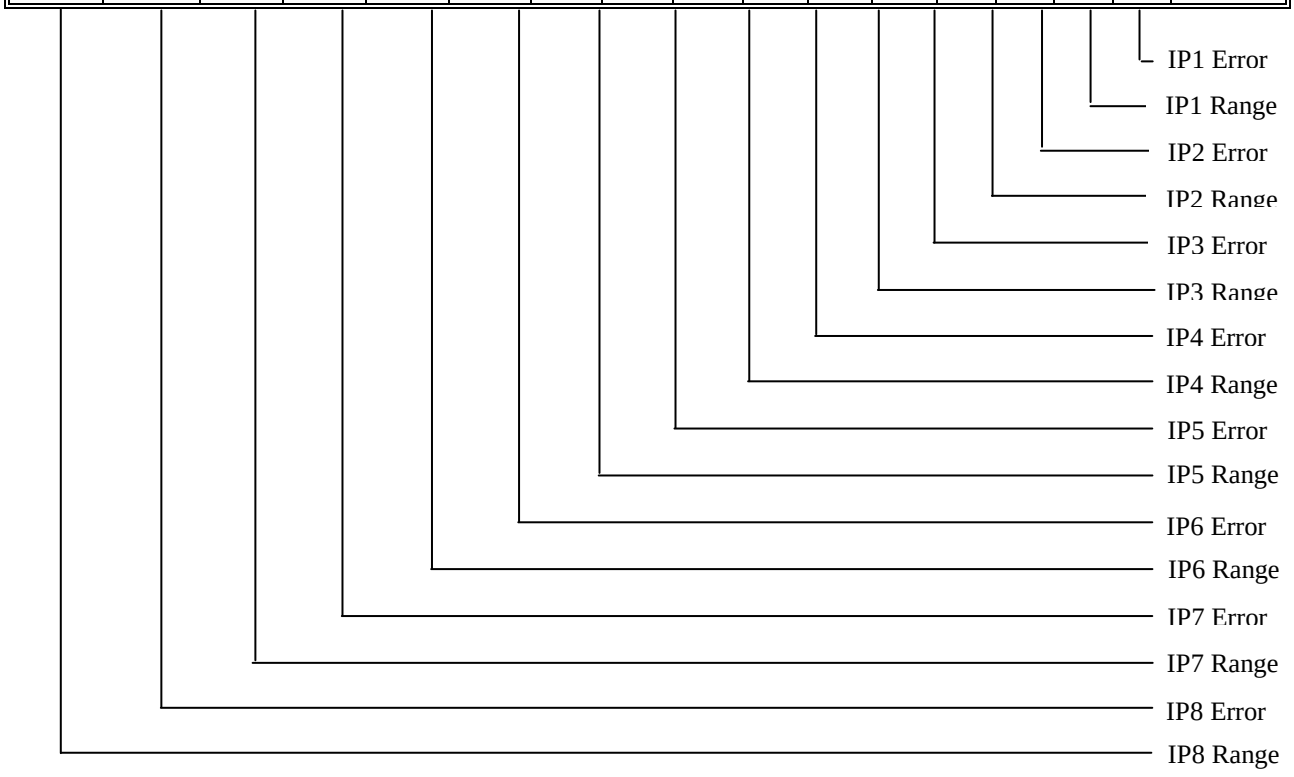
4.7.7.2 Analog Input Status.

There are two status bits associated with each analog input. These bits are used to indicate if the input is zero or open circuit , in the working range 0-10V, or over range. If the input is open circuit or over range, then the error bit will be set. When the error bit is set, the range bit is zero if the input is open circuit and set if the input is over range, ie:

Bit 1- Error	**Bit 2-Range**	**Condition**	**Status LED**
0	don't care	Input working OK.	(LED OFF)
1	0	Input Open circuit or zero.	(LED ON)
1	1	Input Over range.	(LED FLASH)

The analog input status can be read in a single register as follows:

MSB								**PT8AIVS ANALOG INPUT STATUS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30010



4.7.7.3 Analog Input Alarm Status.

There is one alarm status bit associated with each analog input. The alarm bits are used to indicate if the 2-10V voltage input is broken and the bit will be set if the input voltage is less than 1V.

The analog input alarm status can be read in a single register as follows:

MSB								**PT8AIIS ANALOG INPUT ALARM STATUS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30011

IP1 Alarm
IP2 Alarm
IP3 Alarm
IP4 Alarm
IP5 Alarm
IP6 Alarm
IP7 Alarm
IP8 Alarm

4.8 PT8TCS - ISOLATED THERMOCOUPLE INPUTS

4.8.1 Description

The PT8TCS module is an 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.

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 PT8TCS Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT8TCS 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

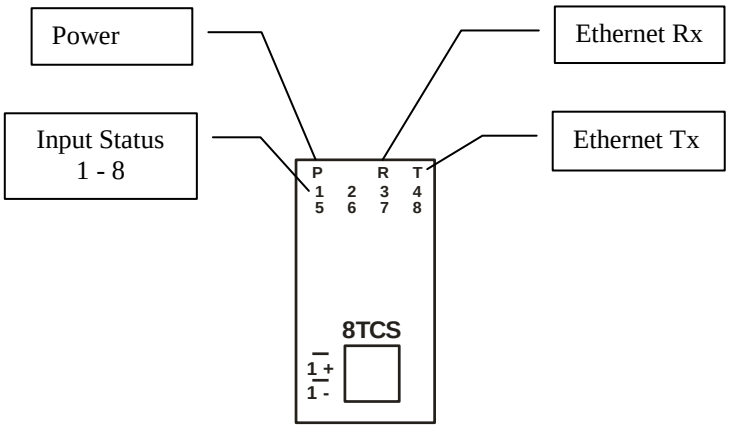
The web page address for viewing the Thermocouple input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration data is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.8.2 Technical Specification of PM8TCS

Power Supply	Logic Supply Voltage		12 -24 Vdc	
	Logic Supply Current		105mA @ 12V / 54mA @ 24V	
TC Inputs	Input Points		8	
	Resolution		0.1°C	
	Drift		100ppm/°C Typ.	
	Isolation		1500Vrms between field and logic 350Vpeak between each TC input	
TC Type	**Number**	**Type**	**Range**	**Accuracy**
	1	J	-150 to 760 °C	0.2°C
	2	K	-200 to 1370 °C	0.3°C
	3	E	-200 to 1000 °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
	13	m V	+/- 100mV	0.1%
Cold Junction	CJC Error		±0.5°C Typ. After 30 Minutes warm up time.	
Ethernet	10/100Mbits/s		Twisted pair.	
Temperature	Operating Temperature.		-40°C to + 80°C	
	Storage Temperature		-40°C to + 85°C	
Connectors	Logic Power and Comms.		4 Pin Connector on underside of unit	
	Inputs		18 Way screw connector on front	
	Ethernet		RJ45 on top side of unit.	

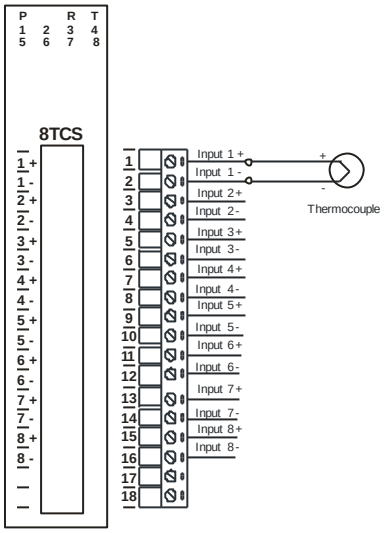
4.8.3 Status Indicators

Power: Flashes to indicate the CPU is running.
Ethernet Rx: Flashes to indicate the unit has received a valid Modbus message.
Ethernet Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "ON" when the thermocouple is open circuit.
"OFF" when the thermocouple is connected.

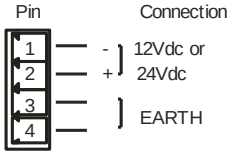


4.8.4 Wiring

The following diagram shows how the inputs are connected to a thermocouple.

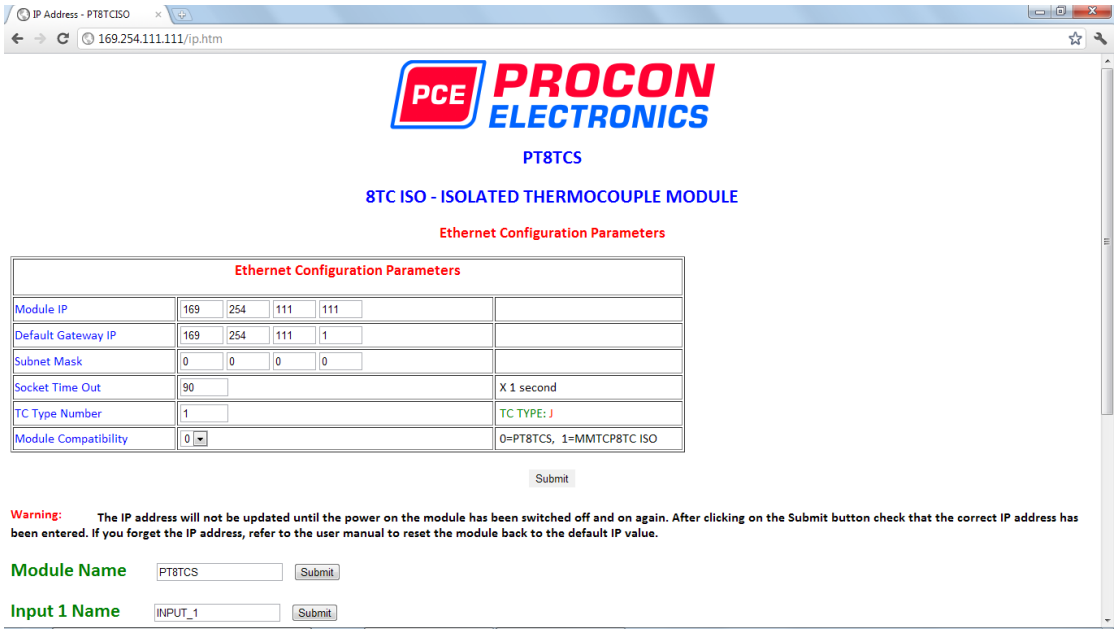


The following diagram shows the wiring for the power.



4.8.5 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 PROMUX TCP Module, select the TC type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



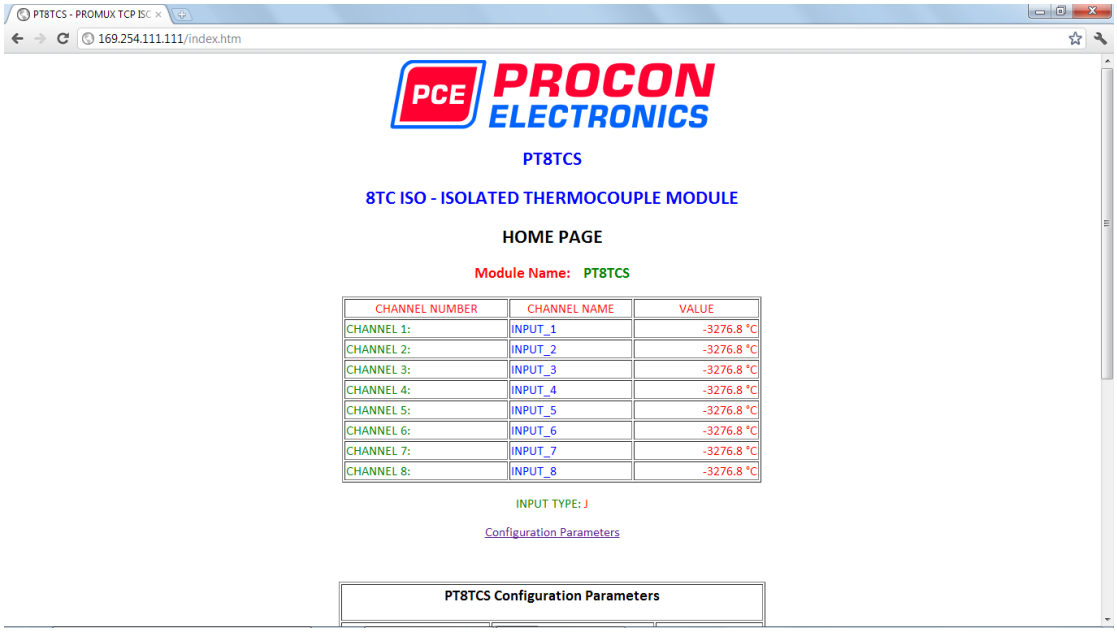
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **TC Type:** The thermocouple type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful

if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

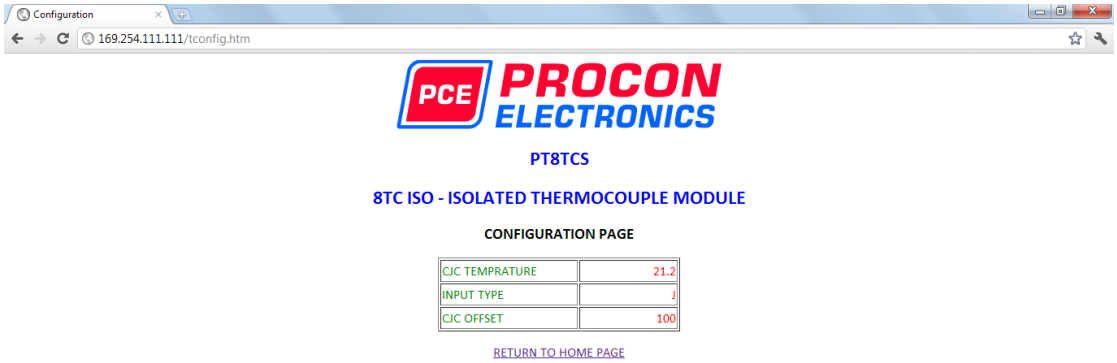
4.8.6 Viewing web pages

To view the default Web page in the PROMUX 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 PROMUX 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

4.8.7 PT8TCS Data Registers (MODULE TYPE = 136)

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 136
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.
30011	Input Status	0	65535	R	bit1 = 0(OK),bit1 = 1(error or open circuit)
40101	TC Type	1	13	R/W	See TC Tables.
40102	Line Frequency	50	60	R/W	Line Frequency
40103	CJC Offset	1	199	R/W	100 = zero offset (0.0)
40104	Units Type	1	2	R/W	1=°C, 2=°F

4.9 PT6RTD - RTD INPUTS

4.9.1 Description

The PT6RTD 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 PT6RTD Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT6RTD 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

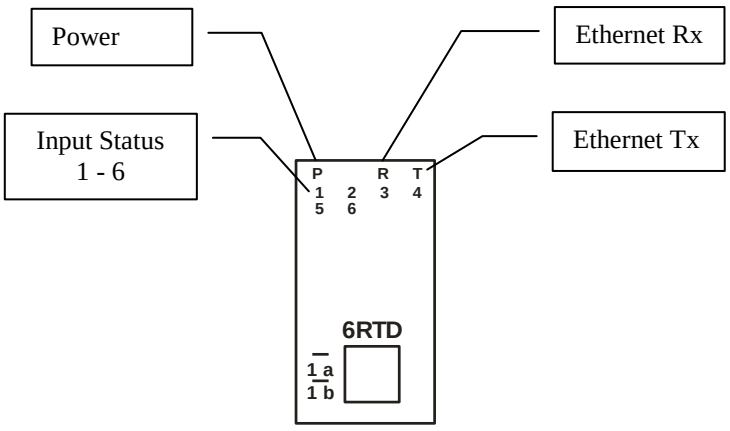
The web page address for viewing the RTD input parameters is http://169.254.111.111/index.htm and the address for viewing the configuration is http://169.254.111.111/tconfig.htm.
The web page address for configuring the module is http://169.254.111.111/ip.htm .

4.9.2 Technical Specification of PT6RTD

Power Supply	Logic Supply Voltage		12 -24 Vdc	
	Logic Supply Current		115mA @ 12V / 58mA @ 24V	
RTD Inputs	Input Points		6	
	RTD Configuration		2 or 3 Wire	
	Resolution		0.1°C	
	Drift		100ppm/°C Typ.	
	Line resistance effect		< 0.1°C balanced	
	Max. line resistance		100ohms	
	Isolation		1500Vrms between field and logic	
RTD Type	**Number**	**Type**	**Range**	**Accuracy**
	1	PT100	-200 to 850°C	0.3°CIEC 751:1983
	2	Ni120	-80 to 320°C	0.3°C
	3	PT1000	-200 to 850°C	0.3°C
	4	Ni1000-DIN	-200 to 850°C	0.3°C
	5	Ni1000-Landys&Gyr	-200 to 850°C	0.3°C
	6	Ohms	10 - 400 ohms	
	7	Ohms	100-4000ohms	
Ethernet	10/100Mbits/s		Twisted pair.	
Temperature	Operating Temperature.		-40°C to + 80°C	
	Storage Temperature		-40°C to + 85°C	
Connectors	Logic Power and Comms.		4 Pin Connector on underside of unit	
	Inputs		18 Way screw connector on front	
	Ethernet		RJ45 on top side of unit.	

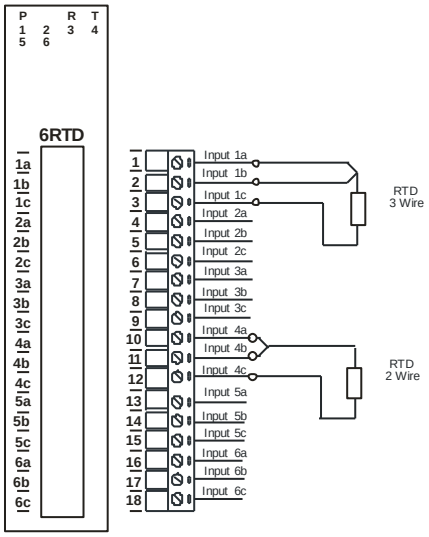
4.9.3 Status Indicators

Power: Flashes to indicate the CPU is running.
Ethernet Rx: Flashes to indicate the unit has received a valid Modbus message.
Ethernet Tx: Flashes to indicate the unit has sent a Modbus message.
Input Status: "ON" when the RTD is open circuit.
"OFF" when the RTD is connected.

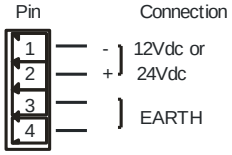


4.9.4 Wiring

The following diagram shows how the inputs are connected to a 2 and 3 wire RTD.

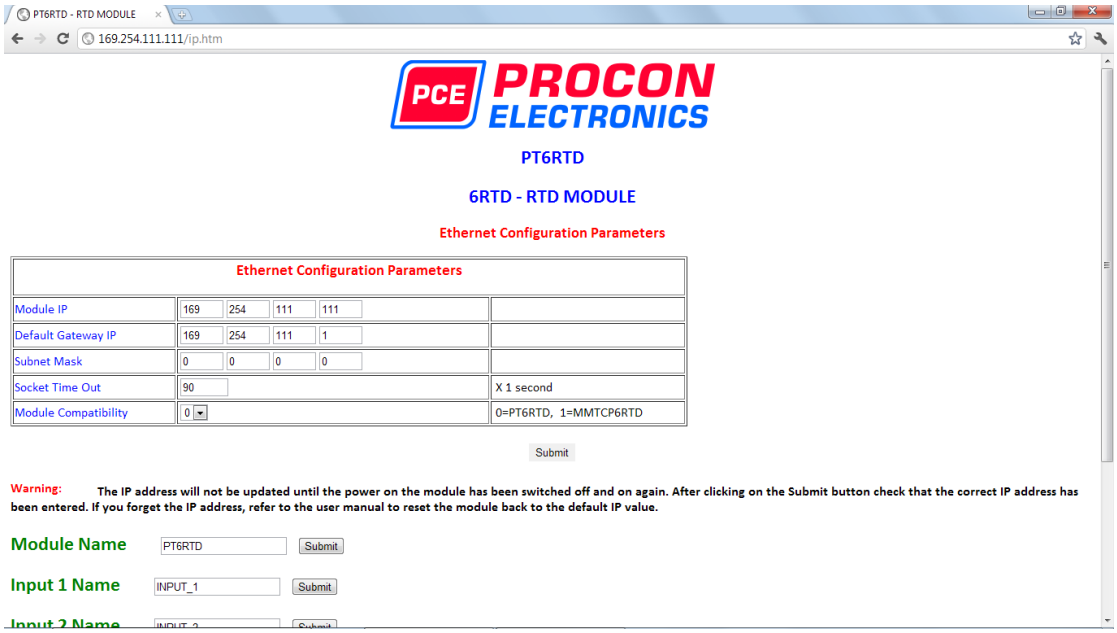


The following diagram shows the wiring for the power.



4.9.5 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 PROMUX TCP Module, select the RTD type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.



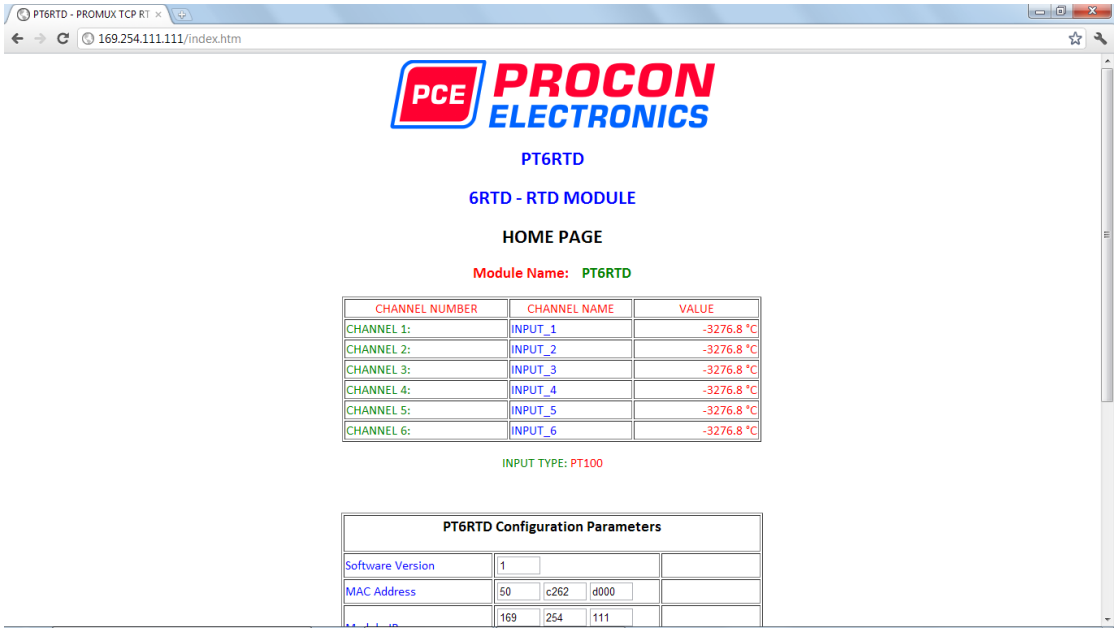
- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **RTD Type:** The RTD type for the module can be configured by entering the corresponding number from the list in the specifications.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful

if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

4.9.6 Viewing web pages

To view the default Web page in the PROMUX 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.

4.9.7 PT6RTD Data Registers (MODULE TYPE = 139)

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
30001	S/W Version / Module Type	N/A	N/A	R	High Byte = Software Version Low Byte = 139
30002	RTD Input 1	-xxx.x	yyyy.y	R	Thermocouple 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	"
30008	Input Status	0	65535	R	bit1 = 0(OK),bit1 = 1(error or open circuit)
40101	RTD Type	1	7	R/W	See RTD Tables.
40102	Line Frequency	50	60	R/W	Line Frequency
40103	Units Type	1	2	R/W	1=°C, 2=°F

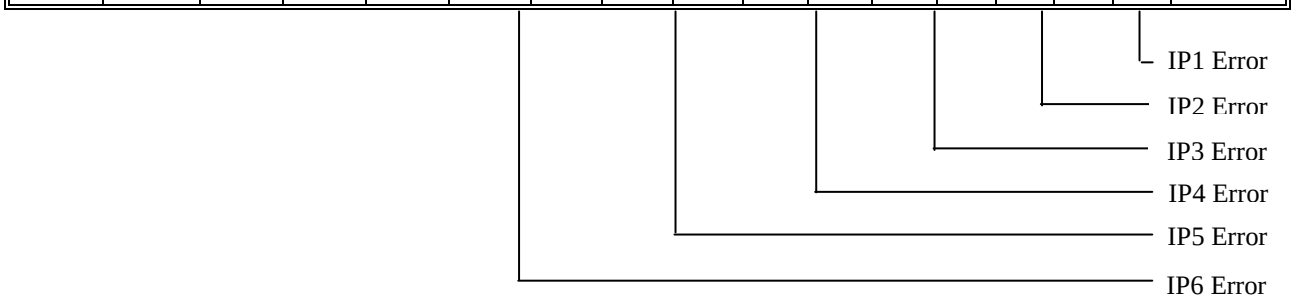
4.9.7.1 RTD Input Status.

There is one status bits associated with each RTD input. These bits are used to indicate if the input is open circuit or over range. If the input is open circuit or over range, then the error bit will be set.

Bit 1- Error	**Bit 2-Not Used**	**Condition**	**Status LED**
0	0	Input working OK.	(LED OFF)
1	0	Open circuit / Over range.	(LED ON)

The analog input status can be read in a single register as follows:

MSB								**PT6RTD ANALOG INPUT STATUS**							LSB	ADDRESS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
32768	16384	8192	4096	2048	1024	512	256	128	64	32	16	8	4	2	1	30008



4.10 PT8AOI - ANALOG OUTPUTS CURRENT

4.10.1 Description

The PT8AOI 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 PT8AOI Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT8AOI 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

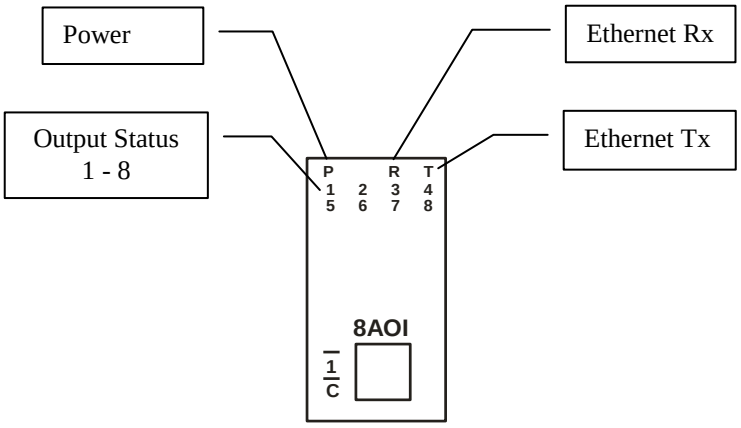
The web page address for viewing the digital output status parameters is http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.10.2 Technical Specification of PT8AOI

Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	67mA @ 12V / 35mA @ 24V
	Field Supply Voltage	24 Vdc
	Field Supply Current	175mA
Current Output	Output Points	8
	Output Current	0(4) - 20 mA
	Resolution	12 bits
	Drift	100ppm/°C
	Accuracy	0.05% of span
	Compliance	1000 ohms max. @ 24Vdc 500 ohms max. @ 12Vdc
Isolation	Between field and logic	1500Vrms between field and logic
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

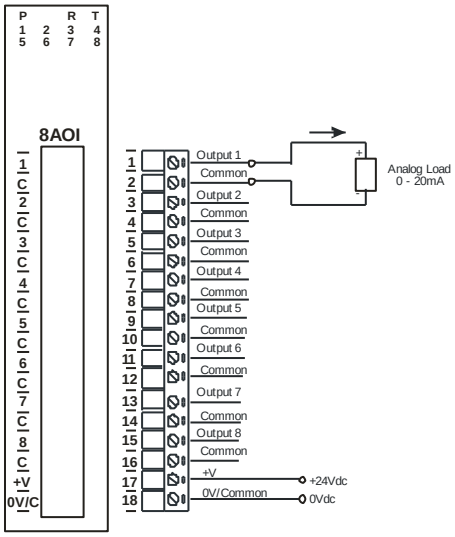
4.10.3 Status Indicators

Power: Flashes to indicate the CPU is running.
RS485 Rx: Flashes to indicate the unit has received a valid Modbus message.
RS485 Tx: Flashes to indicate the unit has sent a Modbus message.
Output Status: "ON" when the output is zero.
"OFF" when the output is between zero and full scale.
"Flashing" when the output is at full scale.

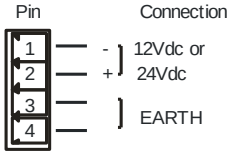


4.10.4 Wiring

The following diagram shows how the analog outputs are connected to a load.

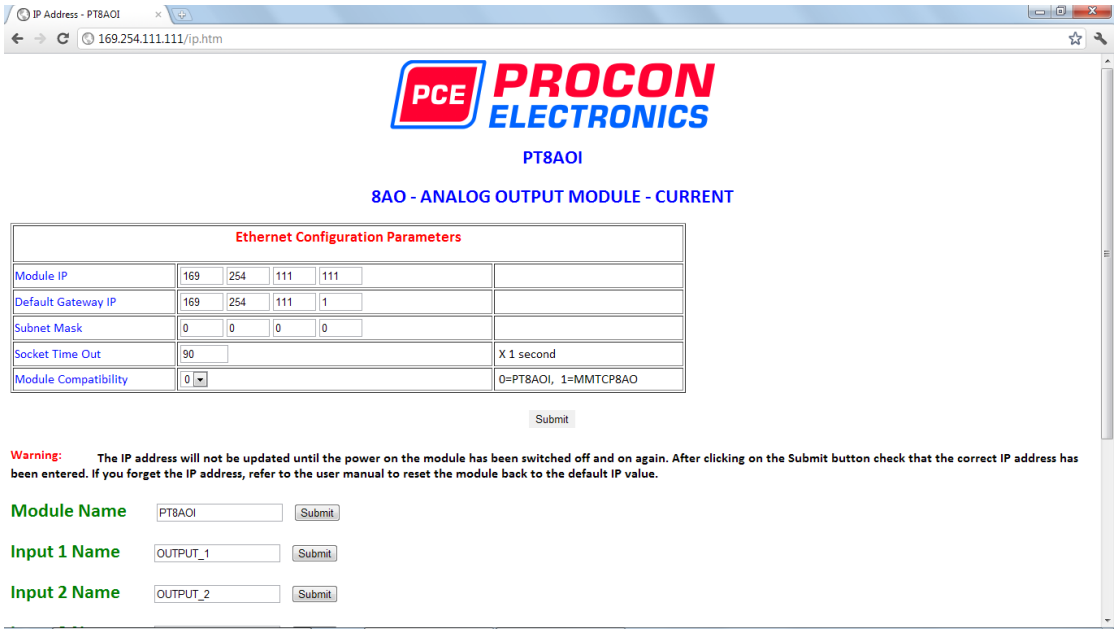


The following diagram shows the wiring for the power.



4.10.5 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 PROMUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.

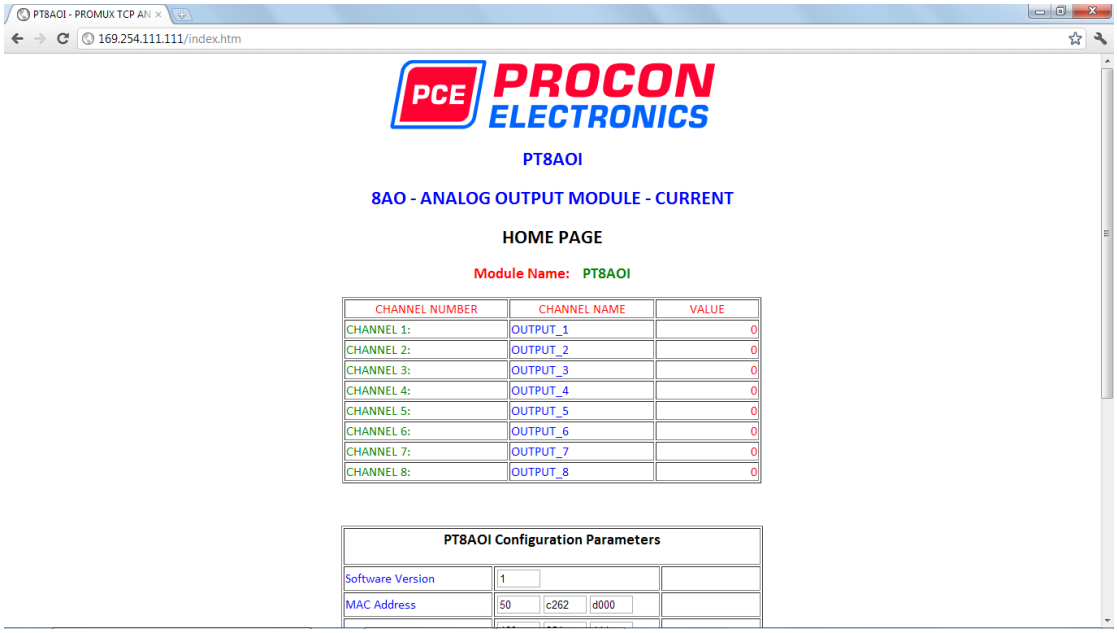


- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

4.10.6 Viewing web pages

To view the default Web page in the PROMUX 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.



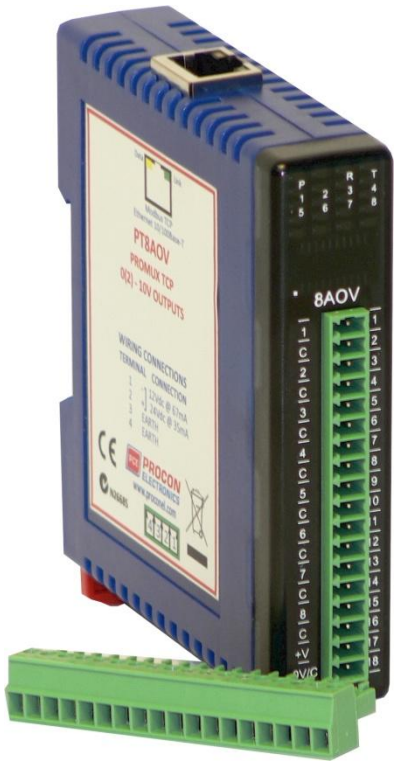
- **Output Number:** This refers to the actual output number on the terminals of the module.
- **Output Name:** This is the name that was entered in the configuration page to best describe the outputs.
- **Value:** This is the current value of the outputs. To get an updated reading it is necessary to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

4.10.7 PT8AOI Data Registers (MODULE TYPE = 140)

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 = 140
40002	Current Output 1	0	4095	R/W	Current Outputs. 0 - 4095 = 0(4) - 20mA.
40003	Current Output 2	0	4095	R/W	"
40004	Current Output 3	0	4095	R/W	"
40005	Current Output 4	0	4095	R/W	"
40006	Current Output 5	0	4095	R/W	"
40007	Current Output 6	0	4095	R/W	"
40008	Current Output 7	0	4095	R/W	"
40009	Current Output 8	0	4095	R/W	"
40010	Output Status	0	65535	R	bit2 = 0(0), bit2 = 1(4095) bit1 = 0(OK),bit1 = 1(error)
40101	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 -255 = enabled.

4.11 PT8AOV - ANALOG OUTPUT VOLTAGE

4.11.1 Description



The PT8AOV Module is an 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 PT8AOV Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the PT8AOV 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 modules are factory programmed with a default IP address of 169.254.111.111. This address must be changed before the module is added to an existing network.

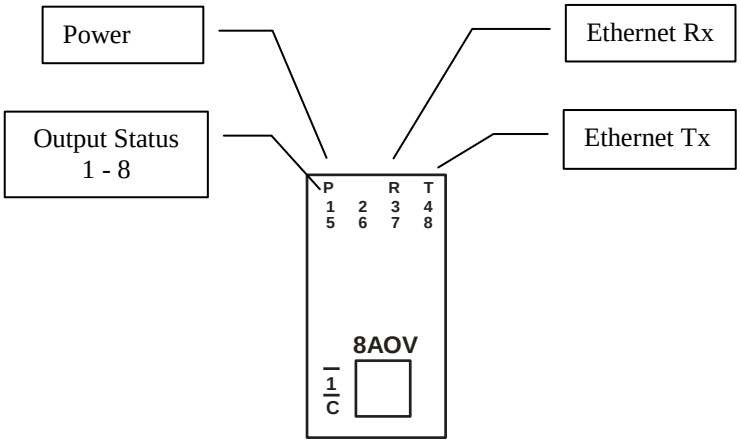
The web page address for viewing the digital output status parameters is http://169.254.111.111/index.htm
The web page address for configuring the module is http://169.254.111.111/ip.htm

4.11.2 Technical Specification of PT8AOV

Power Supply	Logic Supply Voltage	12 -24 Vdc
	Logic Supply Current	67mA @ 12V / 35mA @ 24V
	Field Supply Voltage	24 Vdc
	Field Supply Current	85 mA max.
Voltage Output	Output Points	8
	Output Voltage	0(2) - 10 V
	Resolution	12 bits
	Drift	100ppm/°C
	Accuracy	0.05% of span
	Compliance	2000 ohms min. load
Isolation	Between field and logic	1500Vrms between field and logic
Ethernet	10/100Mbits/s	Twisted pair.
Temperature	Operating Temperature.	-40°C to + 80°C
	Storage Temperature	-40°C to + 85°C
Connectors	Logic Power and Comms.	4 Pin Connector on underside of unit
	Inputs	18 Way screw connector on front
	Ethernet	RJ45 on top side of unit.

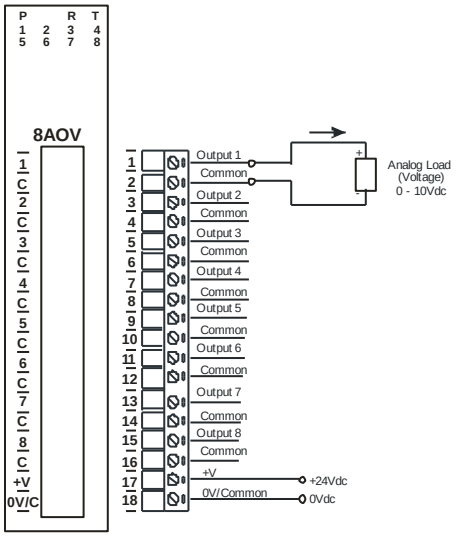
4.11.3 Status Indicators

Power: Flashes to indicate the CPU is running.
Ethernet Rx: Flashes to indicate the unit has received a valid Modbus message.
Ethernet Tx: Flashes to indicate the unit has sent a Modbus message.
Output Status: "ON" when the output is zero.
"OFF" when the output is between zero and full scale.
"Flashing" when the output is at full scale.

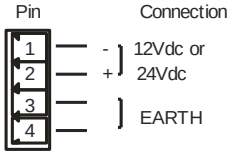


4.11.4 Wiring

The following diagram shows how the analog outputs are connected to a load.

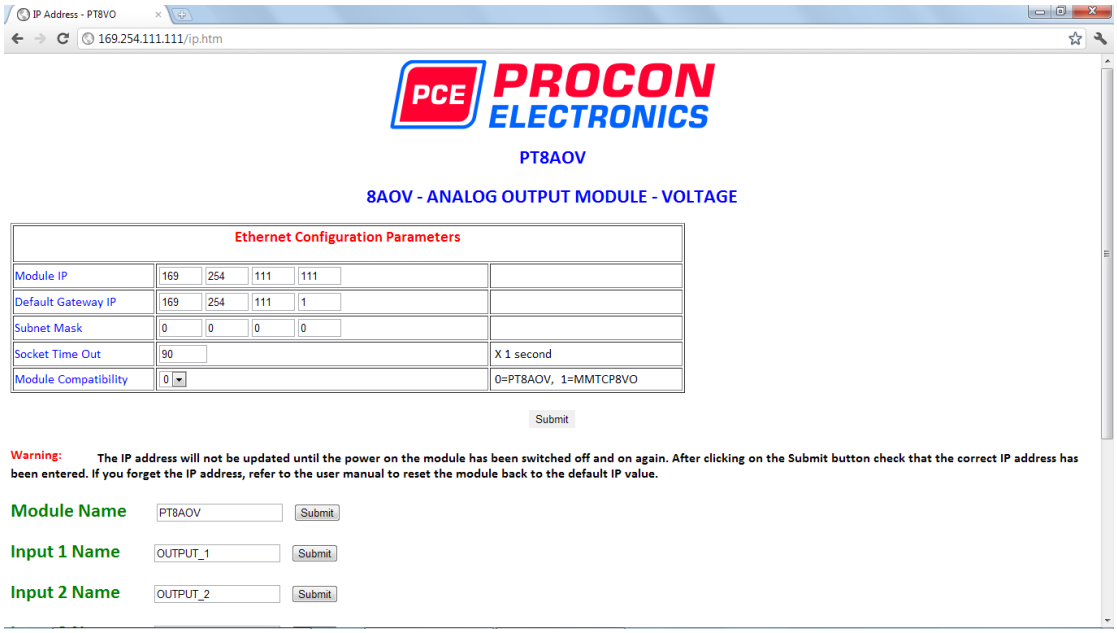


The following diagram shows the wiring for the power.



4.11.5 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 PROMUX TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.

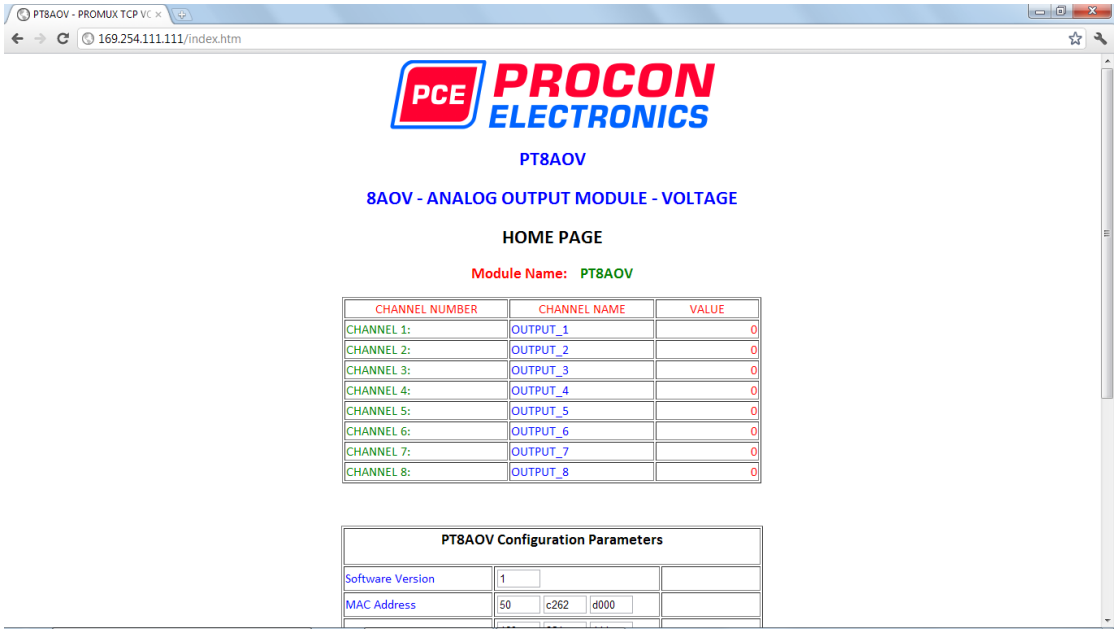


- **IP Address:** The new IP address can be entered into the web page as shown above. After this has been done, you must click the Submit button to send the values to the Module. The screen will now be updated and if successful will continue to display the new IP address. The new IP address will only be effective after the 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 Module will not communicate until you enter the new IP address into the address line of the browser window.
- **Default Gateway IP Address:** A **default gateway** is a node (a router) on a computer network that serves as an access point to another network. In enterprises, however, the gateway is the computer that routes the traffic from a PC to the outside network that is serving the Web pages. It is only necessary to configure the default gateway IP address if the PC that is accessing the Module is on a different network.
- **Subnet Mask:** In computer networks, a **subnetwork** or **subnet** is a range of logical addresses within the address space that is assigned to an organization. The subnet mask is used to inform the Module that it must send its replies to the gateway if the IP address of the PC is on a different network. When the subnet mask is set to "0.0.0.0" then it is effectively disabled and the default gateway is not used. A typical subnet mask would be "255.255.255.0".
- **Socket Timeout:** If a socket connection is broken, say due to a network fault, it must timeout to free it up so that it can be used again. This timer is triggered by activity on the module, so if there is no communications activity for longer than the timeout period, the socket will close.
- **Module Compatibility:** When the value is zero "0", the Modbus registers are configured in the format for a PROMUX TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the MOD-MUX TCP modules. This is useful if a new PROMUX TCP module is being used to replace an old MOD-MUX TCP module in an existing system.

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

4.11.6 Viewing web pages

To view the default Web page in the PROMUX 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.

4.11.7 PT8AOV Data Registers (MODULE TYPE = 141)

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 = 141
40002	Voltage Output 1	0	4095	R/W	Voltage Outputs. 0 - 4095 = 0 - 10V.
40003	Voltage Output 2	0	4095	R/W	"
40004	Voltage Output 3	0	4095	R/W	"
40005	Voltage Output 4	0	4095	R/W	"
40006	Voltage Output 5	0	4095	R/W	"
40007	Voltage Output 6	0	4095	R/W	"
40008	Voltage Output 7	0	4095	R/W	"
40009	Voltage Output 8	0	4095	R/W	"
40010	Output Status	0	65535	R	bit2 = 0(0), bit2 = 1(4095) bit1 = 0(OK),bit1 = 1(error)
40101	Watchdog Timer	0	255	R/W	Timer in seconds. 0 = disabled. 1 -255 = enabled.

5. SPECIFICATIONS

5.1 ENVIRONMENTAL

Operating Temperature	-20°C to +70°C
Storage Temperature	-20°C to +75°C
Humidity	Up to 95% non condensing.

5.2 EMC INSTALLATION INSTRUCTIONS

1. Screened twisted pair cable must be used for I/O and communications with the screens grounded at one point as close to the PROMUX TCP module as possible.
2. The PROMUX TCP modules must be installed in an appropriate enclosure inaccessible to the operator during normal use.

5.3 CONFORMITY CERTIFICATE

DECLARATION OF CONFORMITY
according to EN 45014

Manufacturer's Name:	Procon Electronics Pty Ltd
Manufacturer's Address:	22/195 Prospect Highway Seven Hills NSW 2147 Australia

declares that the product

Product Name:	PROMUX TCP
Model Number(s):	PT16DI, PT16DIB, PT16DO, PT8DIO, PT4RO, PT8AIIS, PT8AIVS, PT8AOI, PT8AOV, PT8TCS, PT6RTD.

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

EMC:	EN 61326-1 Electrical Equipment for measurement, control and laboratory use.

Seven Hills	March 2012	
Location	Date	D.Ruddock

5.4 EMC Test Results

PROMUX TCP EMC Test Results									
Test	Standard	Test Value	PROMUX TCP Product Compliance (PT)						
Immunity Test Results EN 61326-1			16DI	16DIB	16DO	8DIO	4RO	8AIIS	8AIVS
Electrostatic Discharge	IEC 61000-4-2	8KV Air	A	A	A	A	A	A	A
		4KV Contact	A	A	A	A	A	A	A
Radiated Field	IEC 61000-4-3	10V/m	A	A	A	A	A	A	A
Fast Transients	IEC 61000-4-4	Power 2KV	A	A	A	A	A	B	B
		I/O 1KV	A	A	A	A	A	B	B
Surge	IEC 61000-4-5	Power 1KV/2KV	A	A	A	A	A	A	A
RF Conducted	IEC 61000-4-6	Power 3 Vrms	A	A	A	A	A	A	A
Voltage Interrupt	IEC 61000-4-11	0.5cycle 100%	A	A	A	A	A	A	A
Voltage changes, flicker	IEC 61000-3-3		A	A	A	A	A	A	A
Emissions Test Results EN 61326-1 Class A									
Radiated Emissions	CISPR 11	Class A	✓	✓	✓	✓	✓	✓	✓
Conducted Emissions	CISPR 11	Class A	✓	✓	✓	✓	✓	✓	✓

Test	Standard	Test Value	PROMUX TCP Product Compliance (PT)						
Immunity Test Results EN 61326-1			8TCS	6RTD	8AOI	8AOV			
Electrostatic Discharge	IEC 61000-4-2	8KV Air	A	A	A	A			
		4KV Contact	A	A	A	A			
Radiated Field	IEC 61000-4-3	10V/m	A	A	A	A			
Fast Transients	IEC 61000-4-4	Power 2KV	B	B	A	A			
		I/O 1KV	B	B	A	A			
Surge	IEC 61000-4-5	Power 1KV/2KV	A	A	A	A			
RF Conducted	IEC 61000-4-6	Power 3 Vrms	A	A	A	A			
Voltage Interrupt	IEC 61000-4-11	0.5cycle 100%	A	A	A	A			
Voltage changes, flicker	IEC 61000-3-3		A	A	A	A			
Emissions Test Results EN 61326-1 Class A									
Radiated Emissions	CISPR 11	Class A	✓	✓	✓	✓			
Conducted Emissions	CISPR 11	Class A	✓	✓	✓	✓			