BrainChild

DISTRIBUTED MODBUS TCP I/O MODULES
USER MANUAL

Revision History

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Warning Symbol

This document contains notices that you should observe to ensure your safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows.

⚠ The danger symbol indicates that death or severe personal injury may result if proper precautions are not taken. Do not proceed beyond a warning symbol until the indicated conditions are fully understood and met.

Preface

Original equipment manufacturer reserves the right to change information available in this document without notice. The manufacturer is not liable for any damages incurred to equipment / personal during installation or use of equipment as explained in this document. User must acquire sufficient knowledge & skills before using equipment in the application and follow all the local standards & regulations to meet safety requirements.

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TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1 An Overview of The Modbus TCP I/O System

1.1 Introduction

Modbus TCP I/O system is an innovative modular I/O system which provides a simple solution for distributed I/O requirements. The Modbus TCP IO 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 Modbus TCP modules also have built in web servers. This enables configuration and diagnostic data to be accessed via a standard web browser.

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

1-1 IO Modules for PLC Expansion
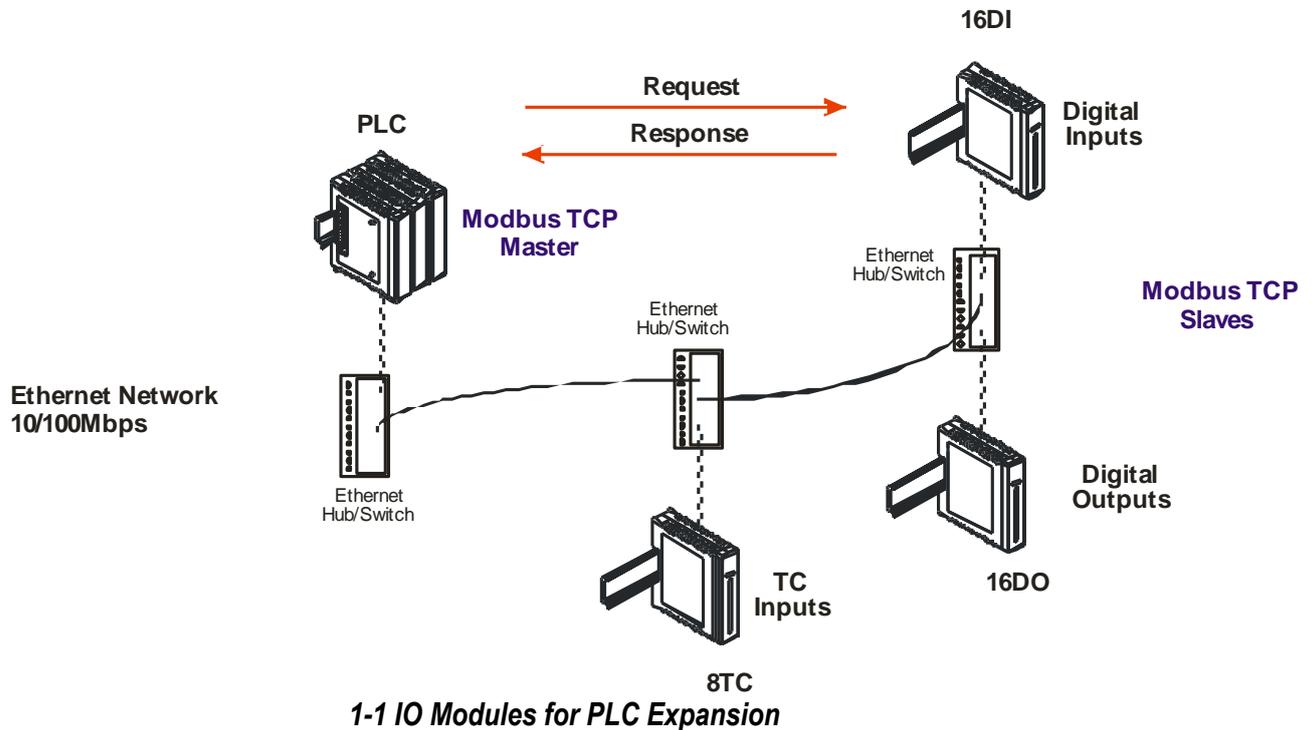
1.2.2 Data Acquisition.

Modbus TCP Modules are used for Data Acquisition where a **PC** (Personal Computer) is connected to the Network. Data Acquisition Studio (DAQ) software and many SCADA software packages support the Modbus TCP Master Protocol and can hence retrieve data from Input Modules or send data to Output Modules.
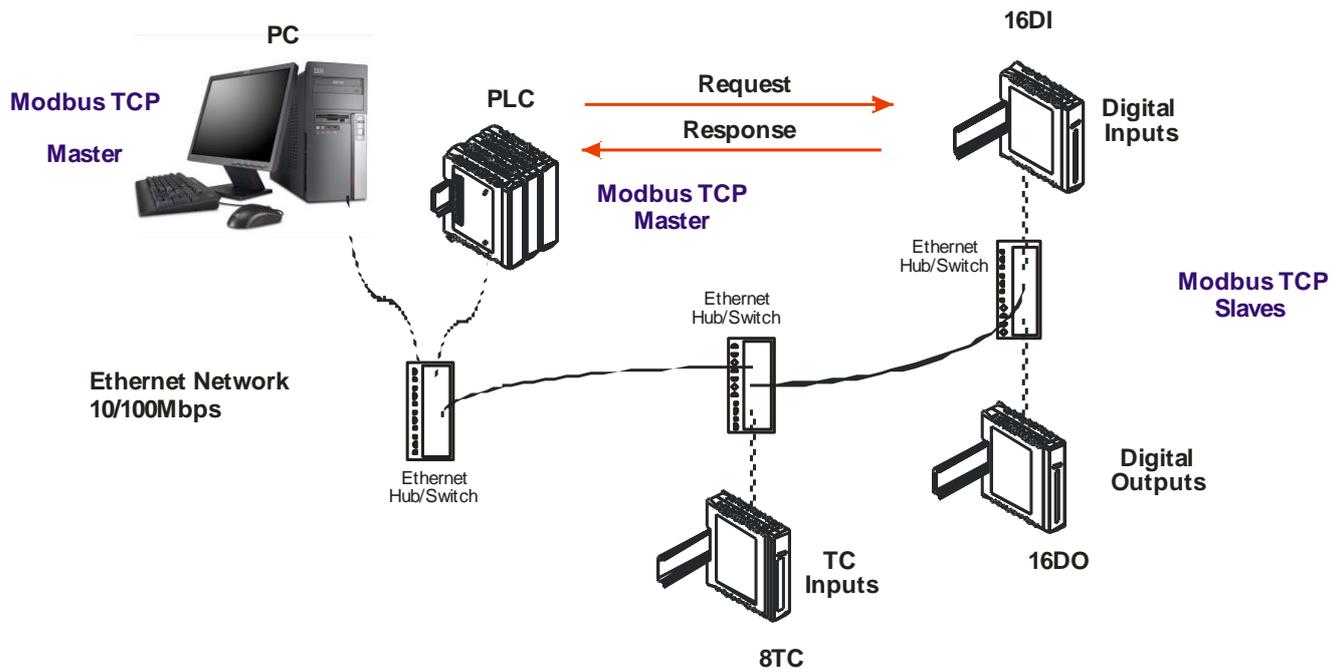
1-2 IO Modules with DAQ software

1.3 Modbus TCP IO Module Selection Guide

MODEL	MODULE TYPE
IO-16DI-E	16 Channel Digital Input Module with Counters
IO-16DO-E	16 Channel Digital Output (Sink or NPN Transistor) Module
IO-8DIO-E	8 Channel Digital Input / 8 Channel Digital Output (Sink or NPN Transistor) Module
IO-4RO-E	4 Channel Relay Output Module
IO-8AIIS-E	8 Channel Isolated Current Input Module
IO-8AIVS-E	8 Channel Isolated Voltage Input Module
IO-8AOI-E	8 Channel Current Output Module
IO-8AOV-E	8 Channel Voltage Output Module
IO-8TCS-E	8 Channel Isolated Thermocouple Input Module
IO-6RTD-E	6 Channel RTD Input Module

1-1 IO Module Selection Guide

2 Modbus TCP IO Modules General Information

2.1 Physical Dimensions

The Modbus TCP IO module 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.
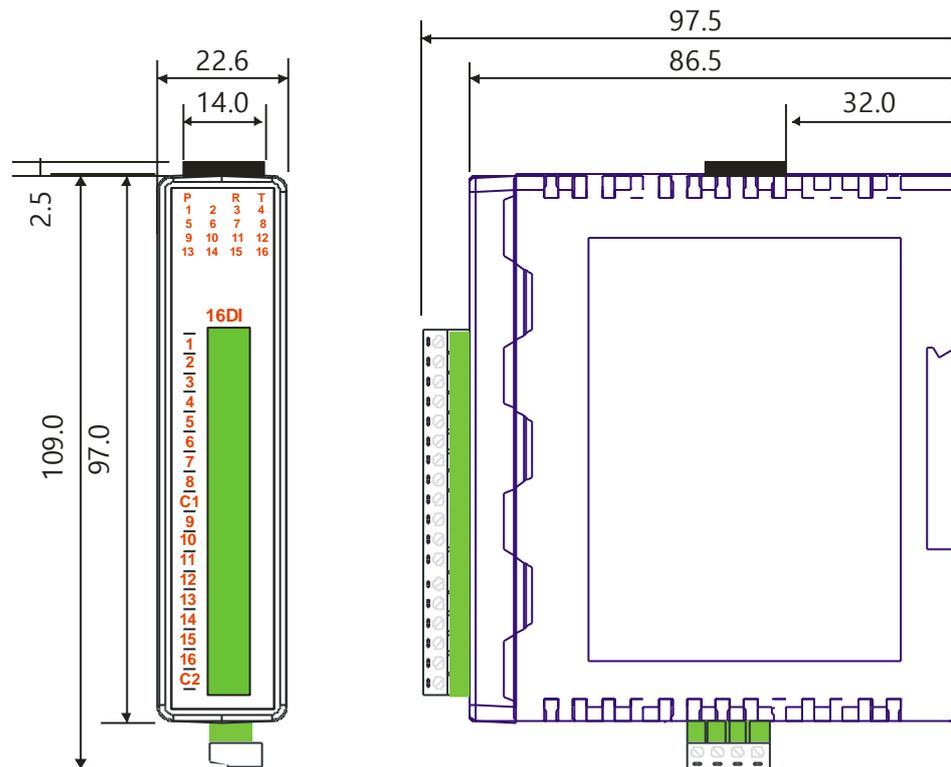
2-1 Dimension

2.2 Grounding / Shielding

In most cases, Modbus TCP IO 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 Modbus TCP IO 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 LEDs on the front panel of the Modbus TCP IO Module are used to indicate the operation of the module.

Web Server Comms

Modbus Comms

Power

3-1 Front LED Indication

Ethernet Activity on Network

Ethernet Link Established
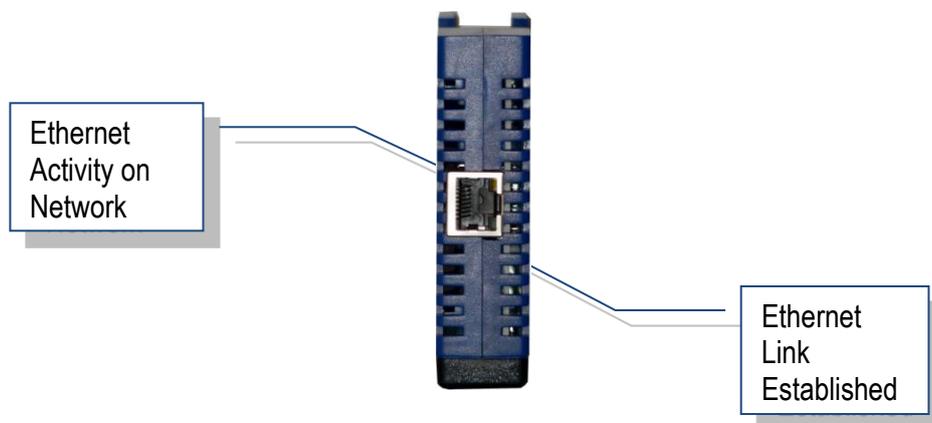
3-2 Ethernet LED Indication

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

If the PC is equipped with an Ethernet port but not connected to a network, a local network address should be used for communication between the Modbus TCP IO Module and the PC. The Modbus TCP IO Module is shipped with a default IP address **192.168.0.112**. This address is in the address area reserved for local networks not connected to the Internet. For direct connection between the PC and the Modbus TCP IO Module, a crossover Ethernet cable is required.
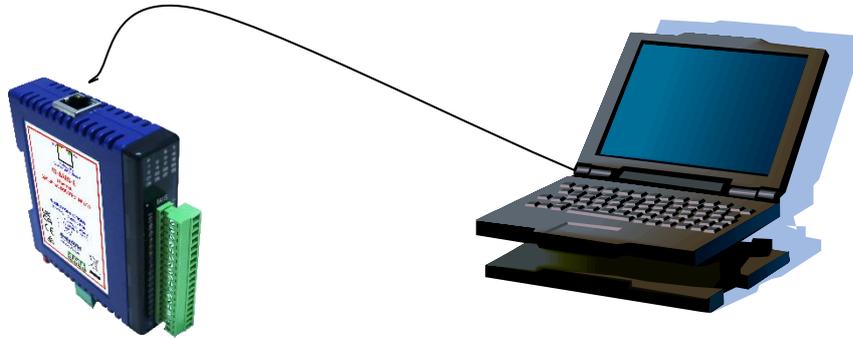
3-3 PC to IO Module Direct Connection

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

- Connect the PC and the Modbus TCP IO Module together using a crossover cable
- Open the Windows Control Panel
- Select Network
- Select Ethernet -> the PC's Ethernet adaptor as shown below
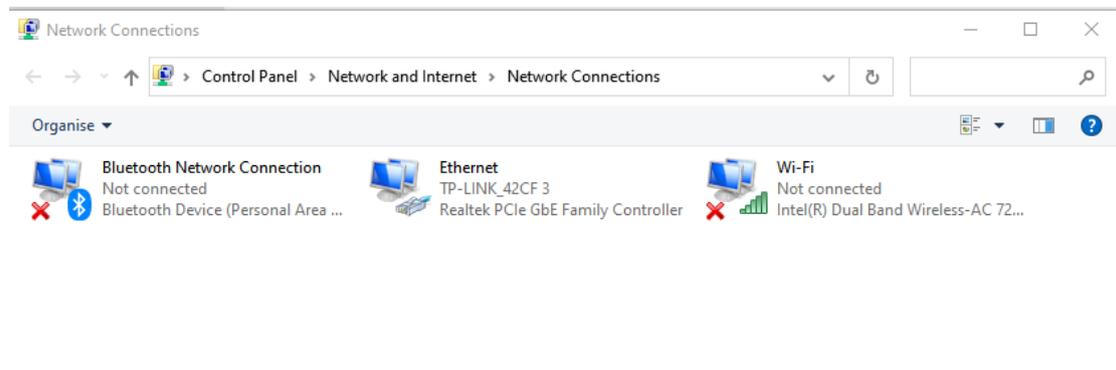
3-4 PC Network Configuration

- Right click on the Ethernet and choose the properties. A TCP/IP Properties box similar to the one below should appear
- Choose the TCP/IPv4 option to configure the PC IP address.
- Insert the IP address 192.168.0.110 and the corresponding subnet mask as shown
- Save your settings by pressing OK in both TCP/IP properties and Network properties
- Reboot your PC
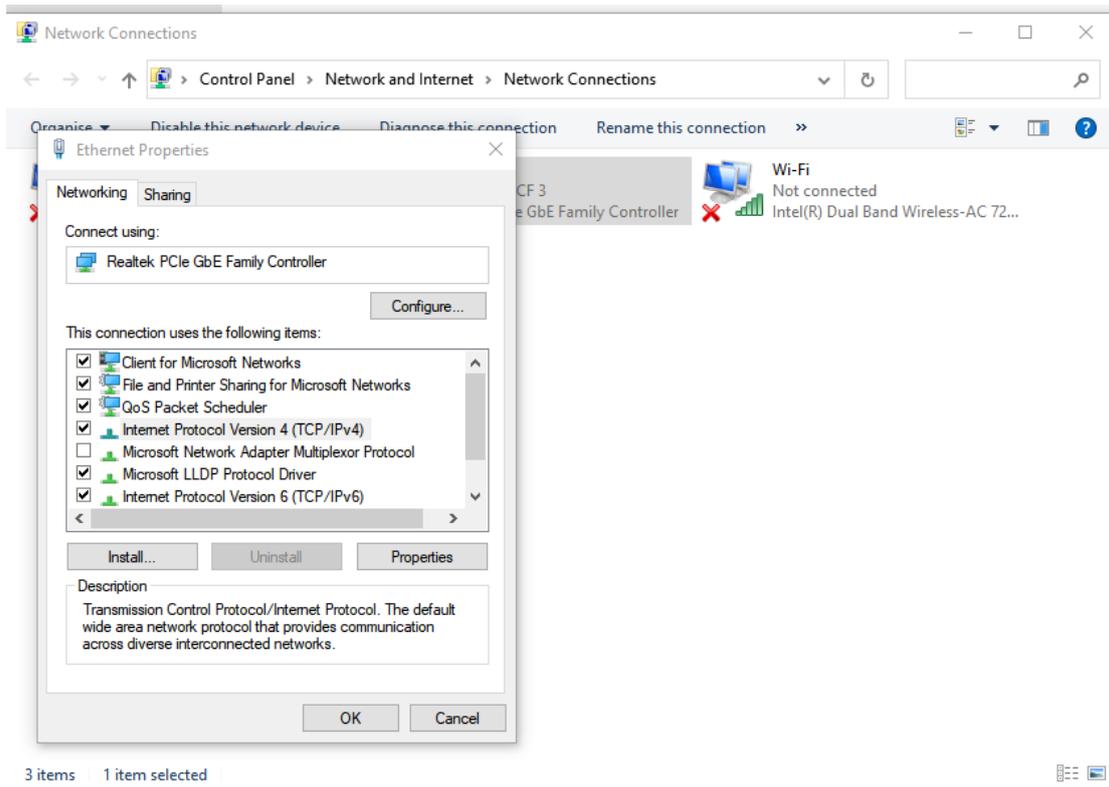
3-5 PC IP Address Configuration
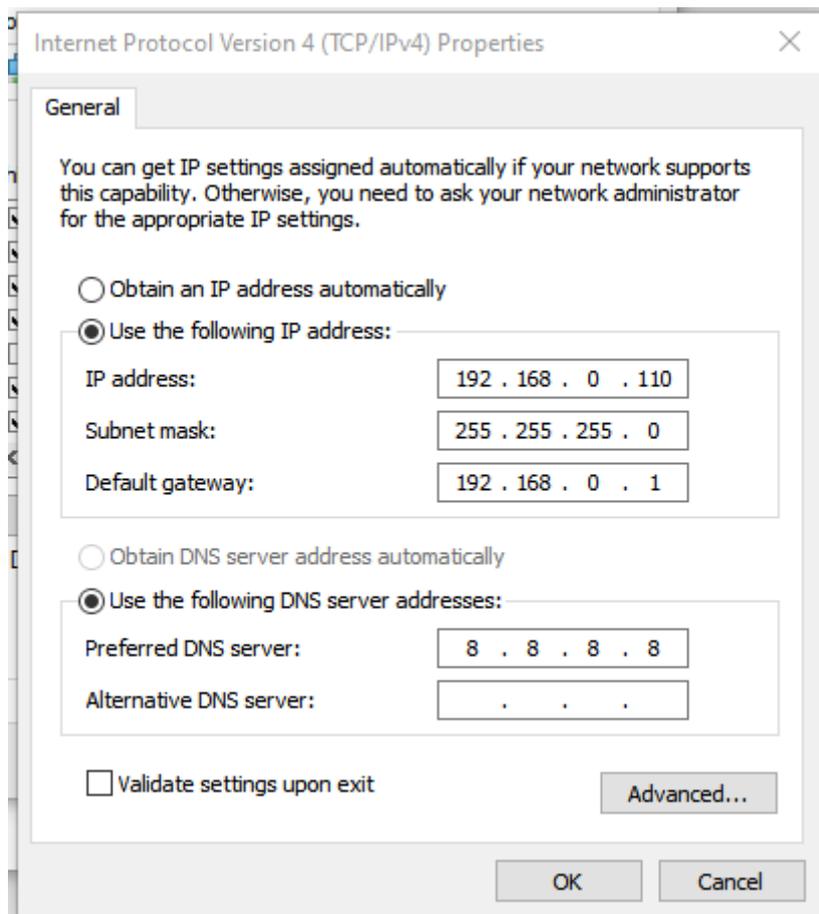
3-6 PC IP Address Configuration

3.4 Connecting to a PC which is connected to a network

If there is an Ethernet network available, the Modbus TCP IO 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 Modbus TCP IO 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 Modbus TCP IO Module is required. Contact the local network administrator to be assigned a free IP address for the Modbus TCP Module. The new IP address is programmed into the Modbus TCP Module using a Web browser software such as Internet explorer. In this case the Modbus TCP IO Module must first be connected directly to a PC as described above.
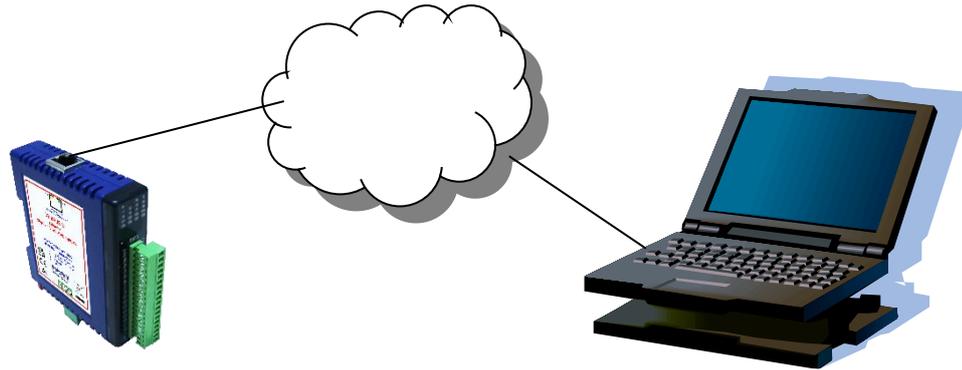
3-7 PC to IO Module Network Connection

In the remaining of this chapter, the IP address 192.168.0.112 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 Modbus TCP IO 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 192.168.0.112"

If the network connection is OK, the program will respond with:
"Reply from 192.168.0.112" 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 Modbus TCP IO 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 Modbus TCP Module.

If there is a problem with the Modbus TCP IO Module the program will respond:
"**Request timed out**", this means that the Modbus TCP IO 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 Modbus TCP IO 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 Modbus TCP IO Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page of the Modbus TCP IO Module will now be displayed in the browser window.
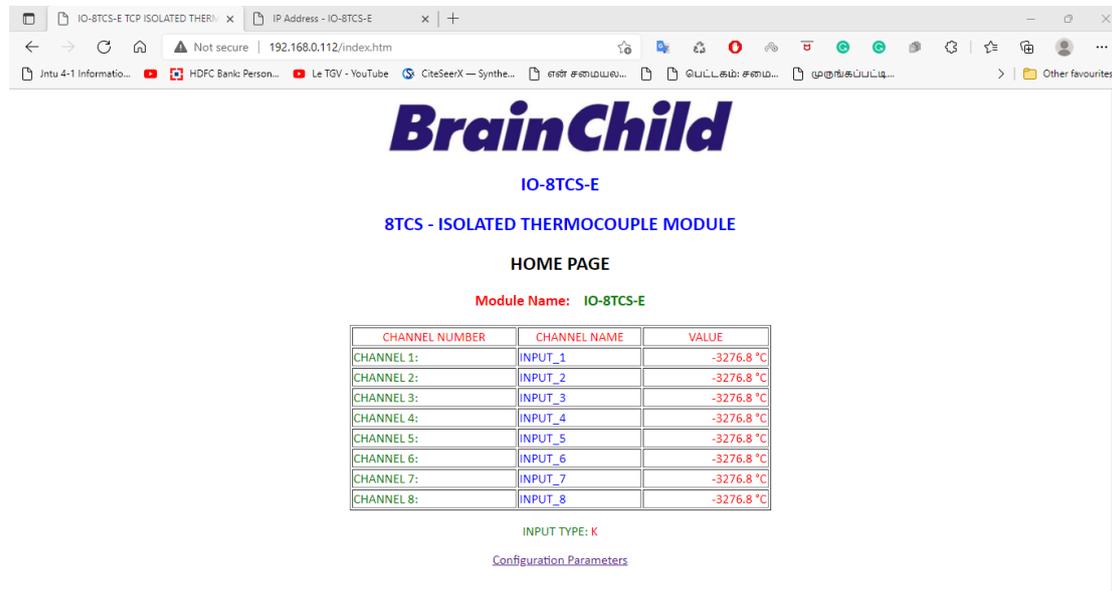
3-8 Web Server

If no Web page is displayed, go back to testing the network connection to the Modbus TCP IO Module by using the ping command. If the Modbus TCP IO Module replies to the ping messages, check the setup of the Web browser. If the Modbus TCP IO 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 Modbus TCP IO 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

Reset switch at rear of module.
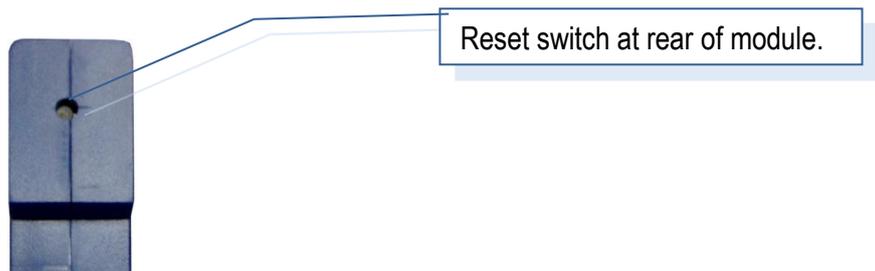
3-9 Reset Switch

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 Modbus TCP Module is connected to the network.
2	Does the Modbus TCP IO Module respond to PING requests?	No	Either the PC or the Modbus TCP Module is setup with wrong IP address. To change the IP address of the Modbus TCP Module back to the default address, open the Modbus TCP Module housing and remove the jumper labeled SIP2. Apply power to the Modbus 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 Modbus TCP Module address. The Modbus TCP Module is shipped with a default IP address of 192.168.0.112, the PC can be setup with an IP address of 198.168.0.110
		Yes	The PC and Modbus 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.

3-1Troubleshooting Guide

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	Starting Address	Variable Type	Access
1	00001	Digital Outputs	R/W
2	10001	Digital Inputs	Read Only
3	30001	Input Registers (Analog)	Read Only
4	40001	Output Registers (Analog)	R/W

3-2 Modbus Register Types

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 Modbus TCP IO 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 Modbus TCP IO Modules

4.1 IO-16DI-E – 16 Channel Digital Inputs with Counters

4.1.1 Description

The IO-16DI-E 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.

4-1 IO-16DI-E

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 IO-16DI-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-16DI-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm and the address for viewing the counters is http://192.168.0.112/counters.htm.
The web page address for configuring the module is http://192.168.0.112/ip.htm and the web page for configuring the counters is http://192.168.0.112/countcfg.htm .

4.1.2 Technical Specification of IO-16DI-E

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.

4-1 IO-16DI-E Specifications

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.
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.
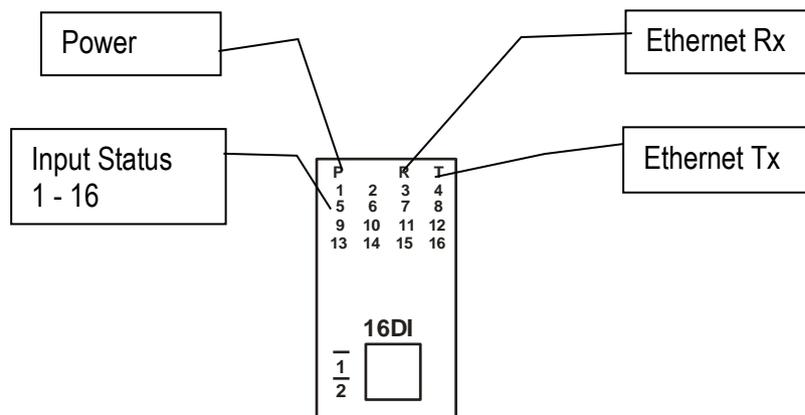
4-2 IO-16DI-E Status Indicators

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.
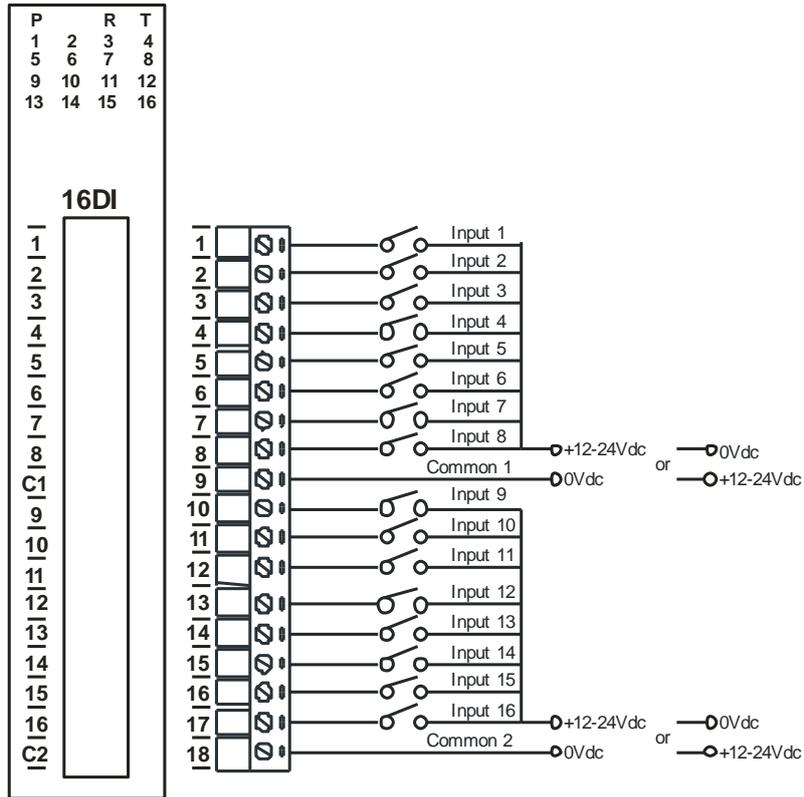
4-3 IO-16DI-E Wiring -Potential Free Switch

The following diagram shows how the digital inputs are connected a NPN transistor or a PNP transistor.
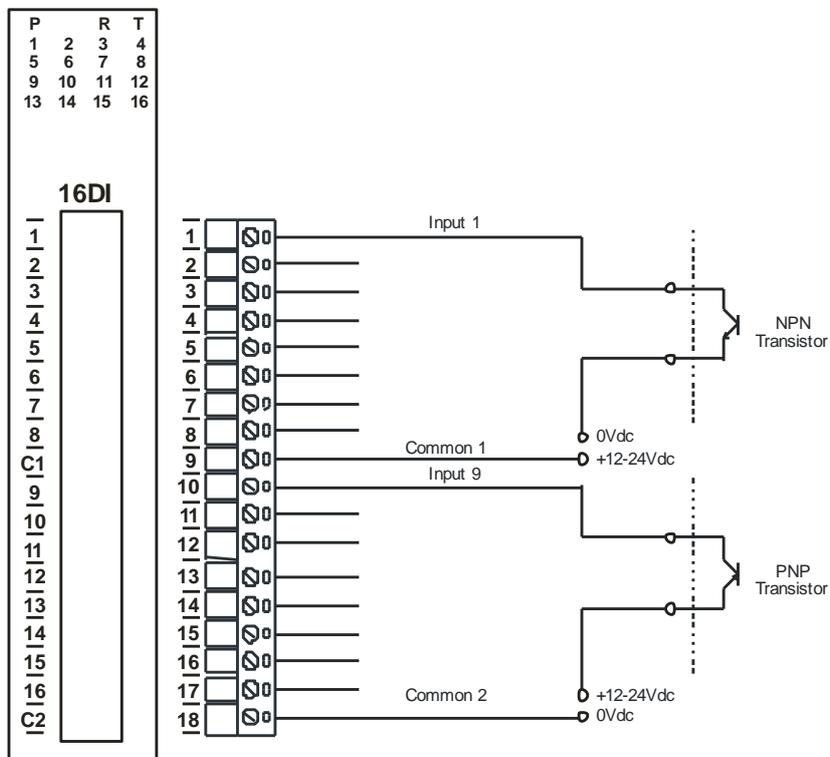
4-4 IO-16DI-E Wiring -NPN / PNP Transistor

The following diagram shows the wiring for the power.
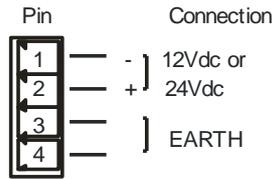
4-5 IO-16DI-E Power Wiring

4.1.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address of the Modbus TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.
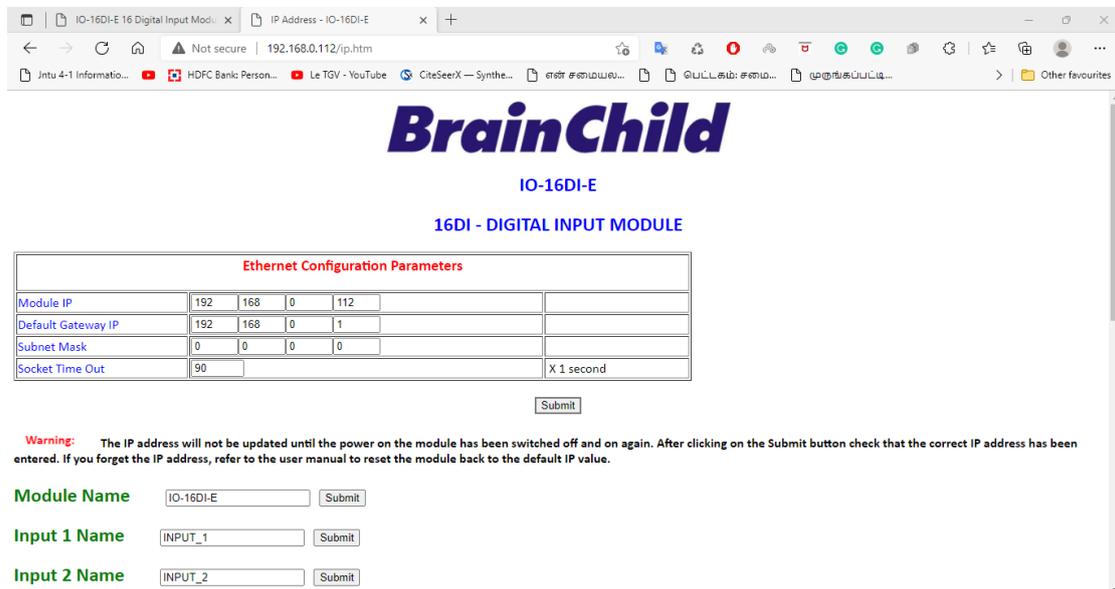
4-6 IO-16DI-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the Modbus 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 "**192.168.0.112/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.

4-7 IO-16DI-E Web Page Counter Configuration

- **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 Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.
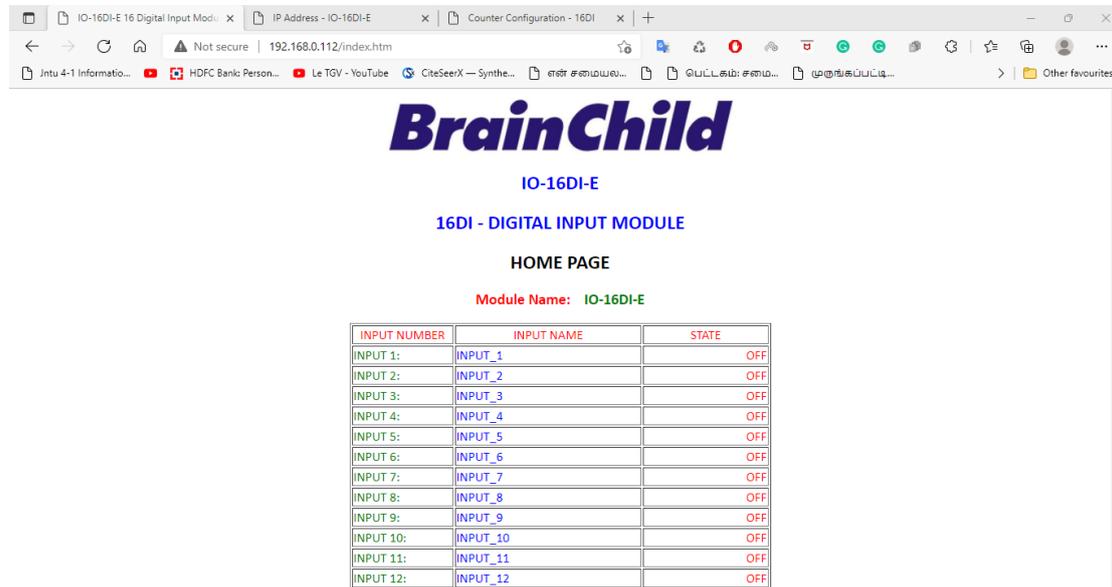
4-8 IO-16DI-E Web Page View IO Status

- **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 Modbus TCP Module, start the Web browser and type "**192.168.0.112/counter.htm**" into the address line of the browser window.
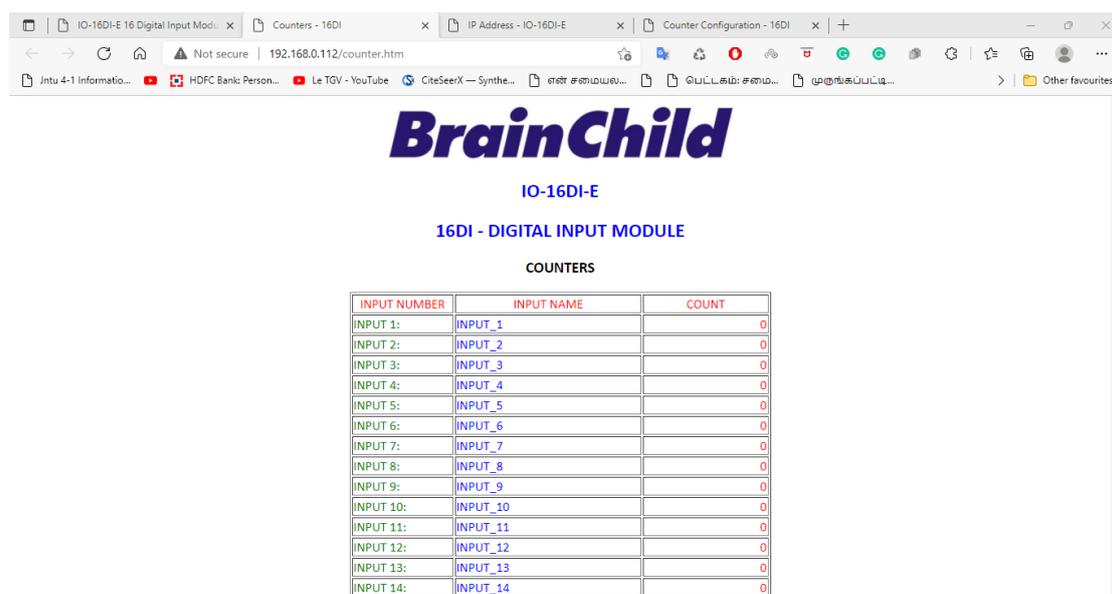
4-9 IO-16DI-E Web Page View Counter Status

- **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 IO-16DI-E -Modbus Mapping (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	"

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

Modbus Address	Register Name	Low Limit	High Limit	Access	Description
40062	CCounter 14MSB	0	65535	R/W	"
40063	CCounter 14LSB	0	65535	R/W	"
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 IO-16DI-E Modbus Mapping

4.1.7.1 Digital Input Register

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

MSB					IO-16DI-E 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

4-3 IO-16DI-E Digital Input Register

4.1.7.2 Counter Registers

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

Counter High Value (MSB) = Register 40003.
Counter Low Value (LSB) = Register 40004.
Counter Value = (Counter High Value X 65536) + 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 IO-16DO-E-16 Channel Digital Outputs

4.2.1 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.

4-10 IO-16DO-E

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 have 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 IO-16DO-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-16DO-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm
The web page address for configuring the module is http://192.168.0.112/ip.htm

4.2.2 Technical Specification of IO-16DO-E

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.

4-4 IO-16DO-E Specifications

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.
Output Status: "OFF" when the output is off.
"ON" when the output is on.
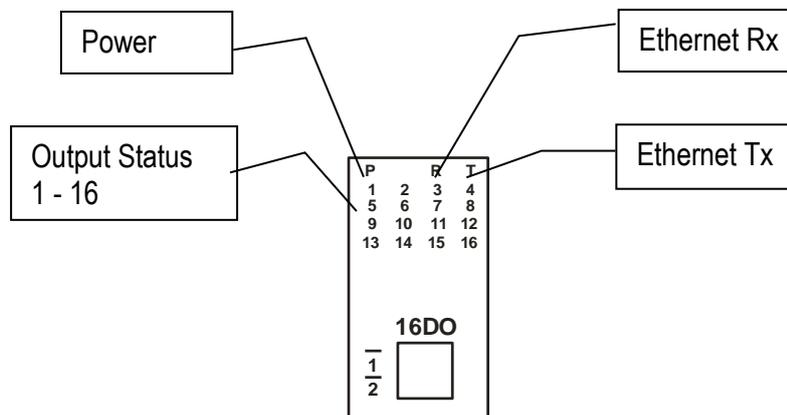
4-11 IO-16DO-E Status Indicators

4.2.4 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.
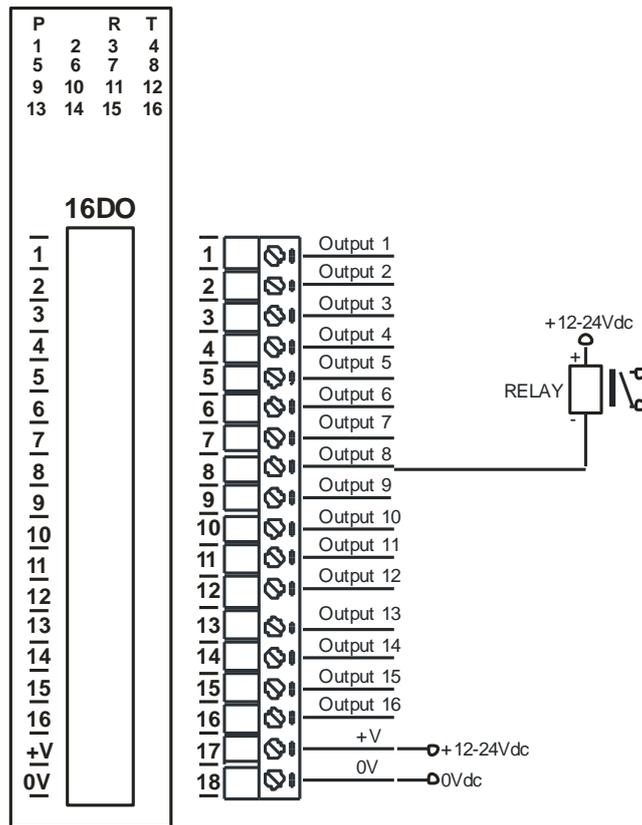
4-12 IO-16DO-E Output Wiring

The following diagram shows the wiring for the power.
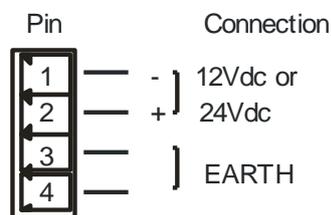
4-13 IO-16DO-E Power Wiring

4.2.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address of the Modbus TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.
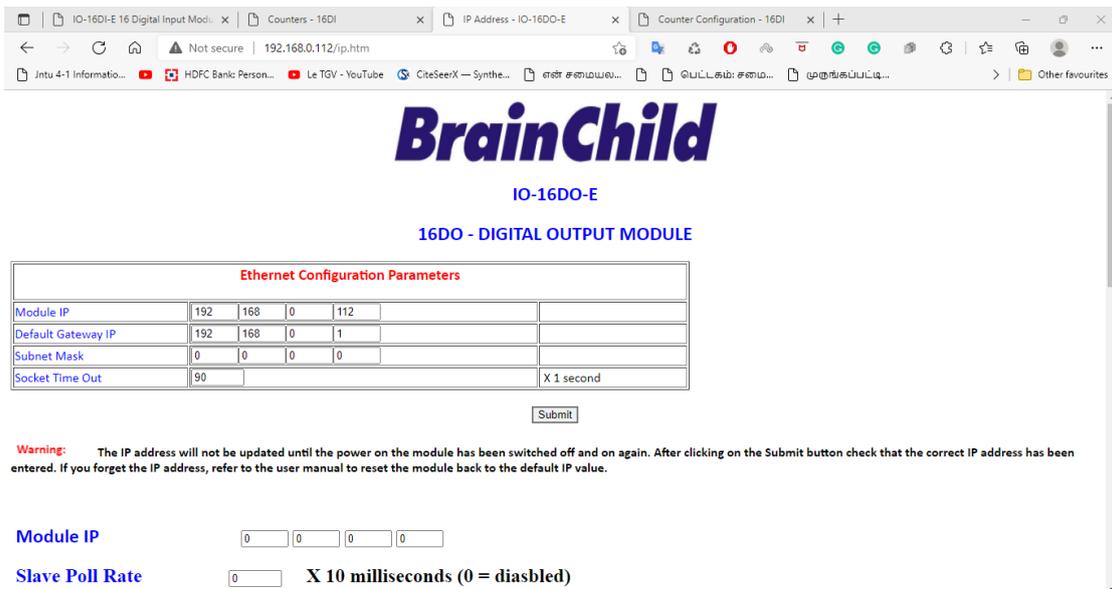
4-14 IO-16DO-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.

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

4.2.6 Viewing web pages

To view the default Web page in the Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.
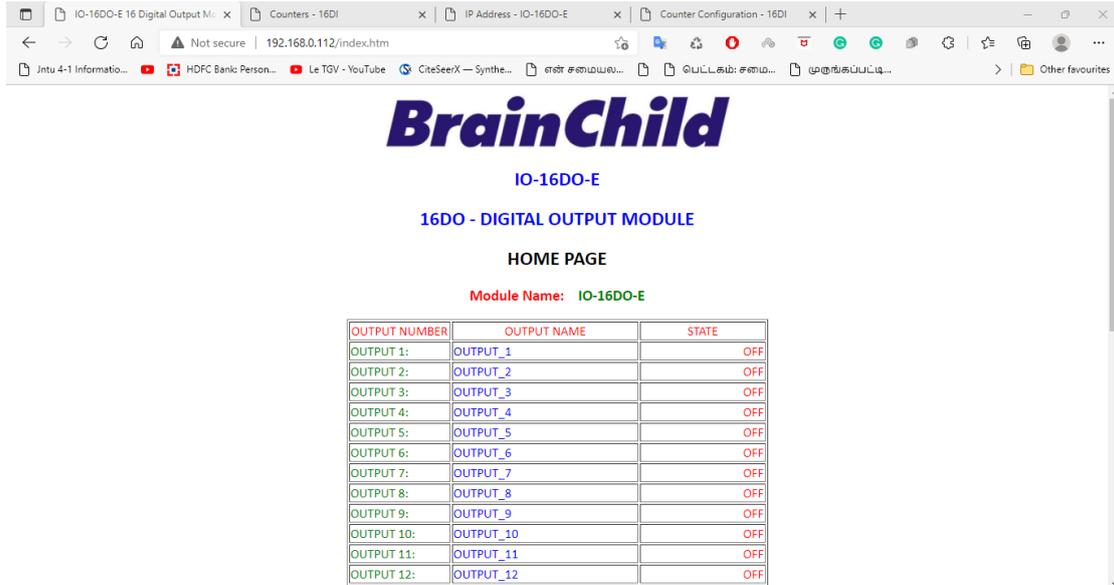
4-15 IO-16DO-E Web Page View- DO Status

- **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.

4.2.7 IO-16DO-E – Modbus Mapping (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.

4-5 IO-16DO-E Modbus Mapping

4.2.7.1 Digital Output Register.

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

MSB							IO-16DO-E DIGITAL OUTPUTS						LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	ADDRESS
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

4-6 IO-16DO-E Digital Output Register

4.2.7.2 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.

4.3 IO-4RO-E – 4 Channel Relay Outputs

4.3.1 Description

The IO-4RO-E 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 is required.

4-16 IO-4RO-E

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 have 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 IO-4RO-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-4RO-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm

The web page address for configuring the module is http://192.168.0.112/ip.htm

4.3.2 Technical Specification of IO-4RO-E

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.

4-7 IO-4RO-E Specifications

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.
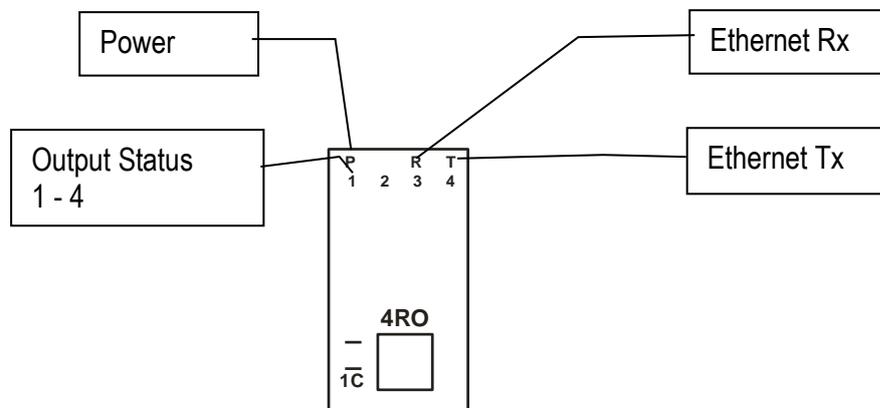
4-17 IO-4RO-E Status Indicators

4.3.4 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.
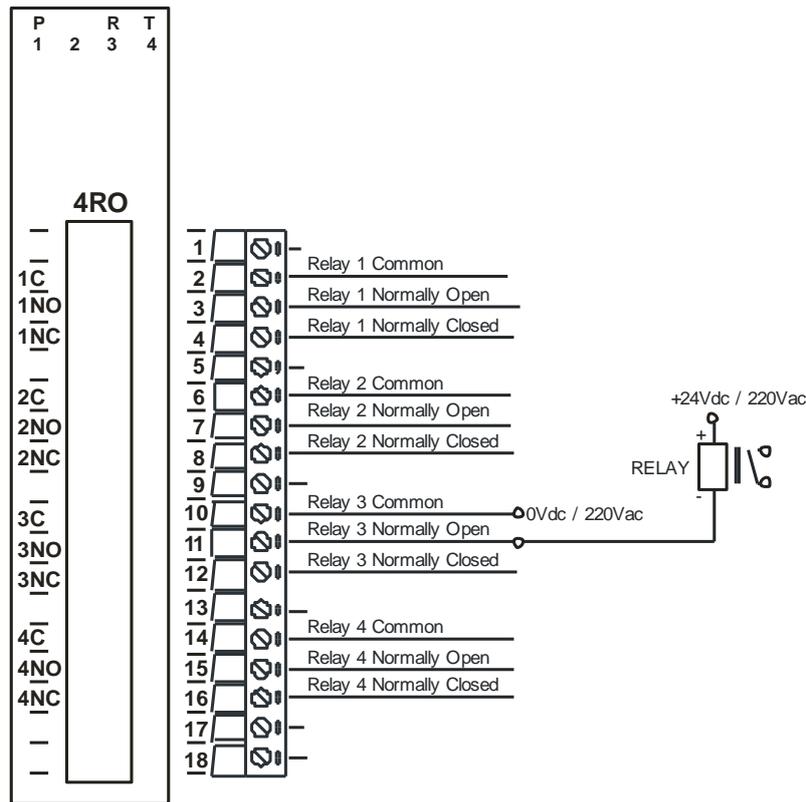
4-18 IO-4RO-E Output Wiring

The following diagram shows the wiring for the power.
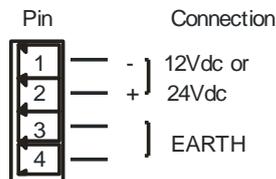
4-19 IO-4RO-E Power Wiring

4.3.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address of the Modbus TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.
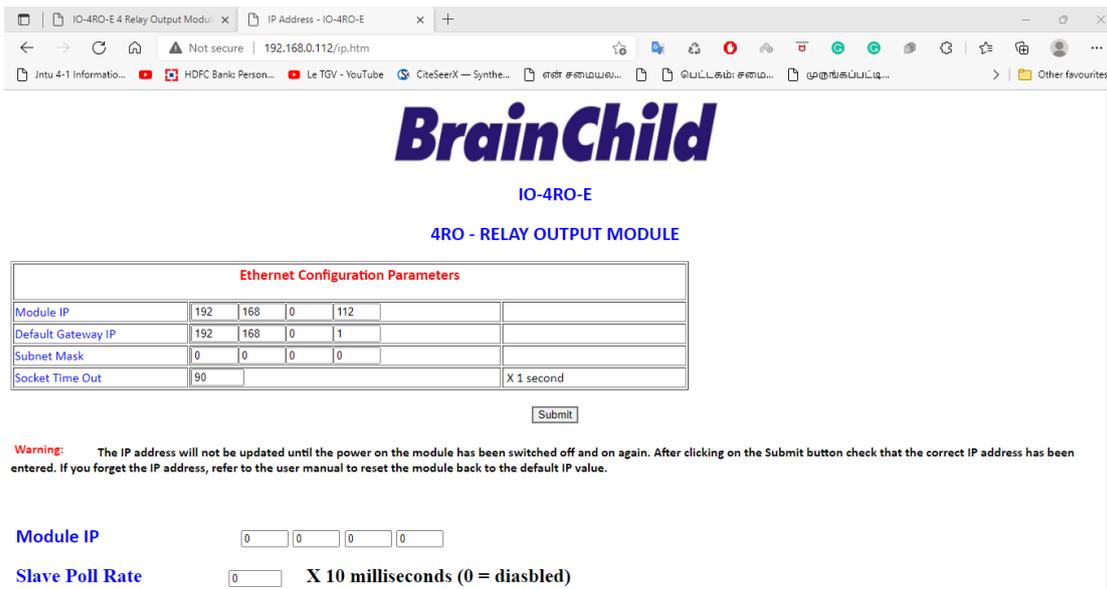
4-20 IO-4RO-E Web Page Configuration

- **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 Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.

- **Output Names:** These fields allow you to enter an output description name into the Modbus 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 Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.
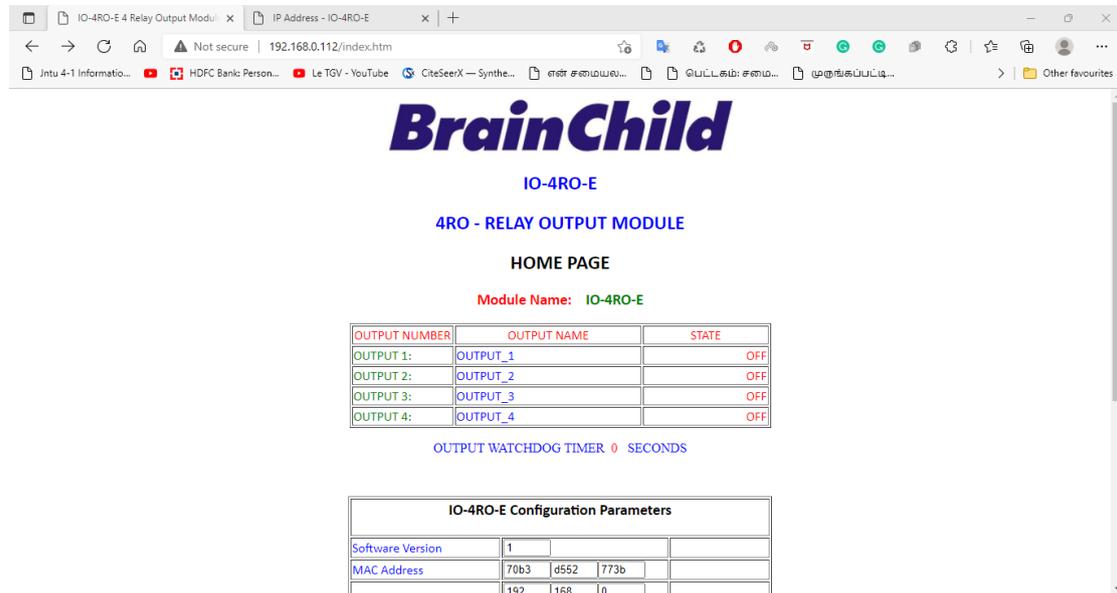
4-21 IO-4RO-E Web Page View- RO Status

- **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 IO-4RO-E – Modbus Mapping (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.

4-8 IO-4RO-E Modbus Mapping

4.3.7.1 Relay Output Register.

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

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

Relay Output

4-9 IO-4RO-E Digital Output Register

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   IO-8DIO-E – 8 Channel Digital Inputs/Outputs with Counters

4.4.1 Description

The IO-8DIO-E 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.

4-22 IO-8DIO-E

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 IO-8DIO-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-8DIO-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP

address of 192.168.0.112. 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://192.168.0.112/index.htm and the address for viewing the counters is http://192.168.0.112/counters.htm.

The web page address for configuring the module is http://192.168.0.112/ip.htm and the web page for configuring the counters is http://192.168.0.112/countcfg.htm .

4.4.2 Technical Specification of IO-8DIO-E

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.

4-10 IO-8DIO-E Specifications

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

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.
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.
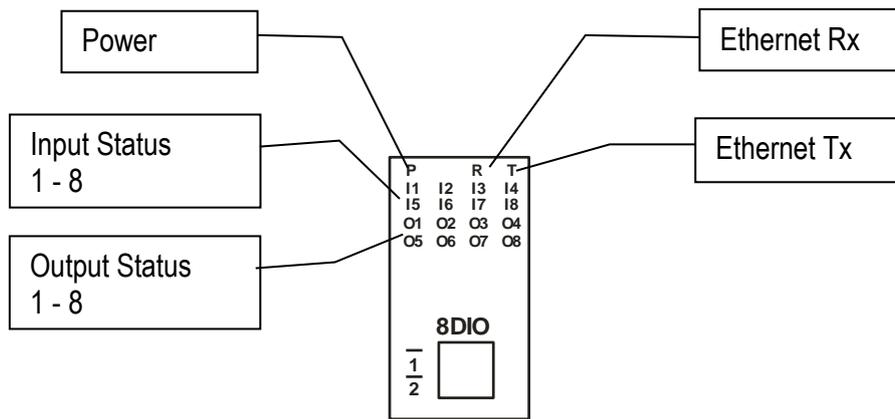
4-23 IO-8DIO-E Status Indicators

4.4.4 Wiring

The following diagram shows how the digital inputs and outputs are connected.
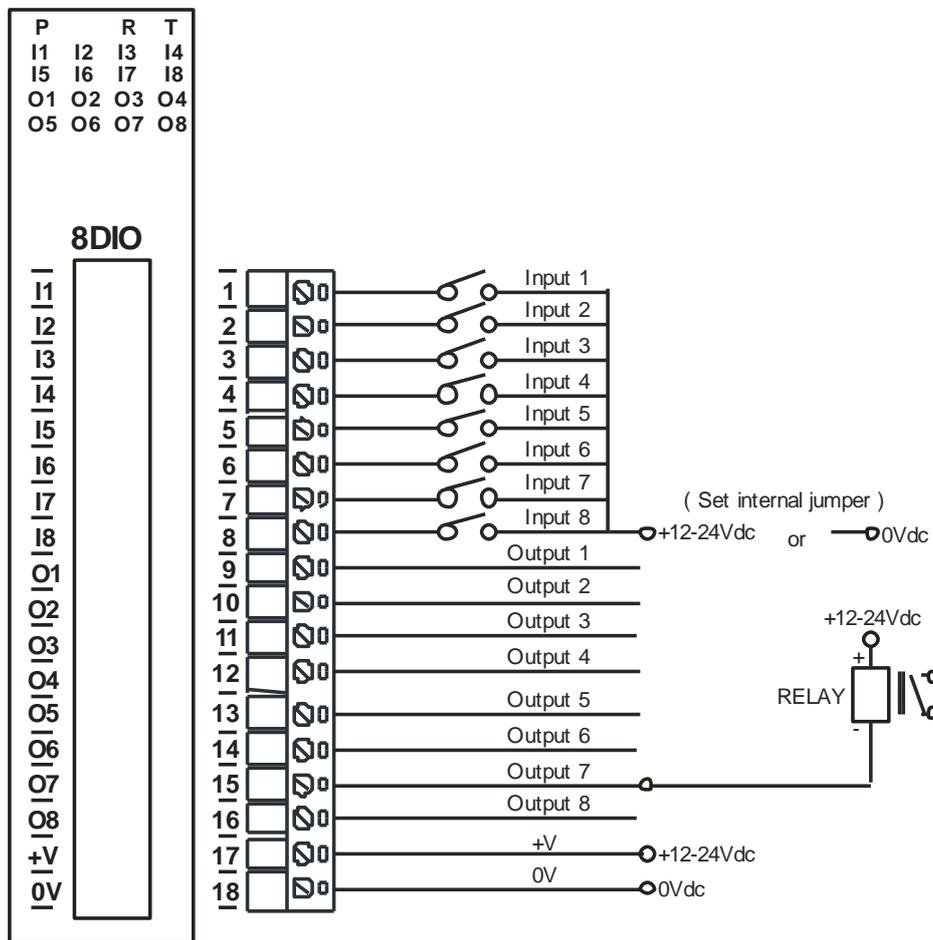
4-24 IO-8DIO-E Input / Output Wiring

The following diagram shows the wiring for the power.
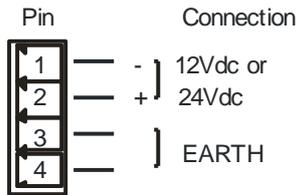
4-25 IO-8DIO-E Power Wiring

4.4.5 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.
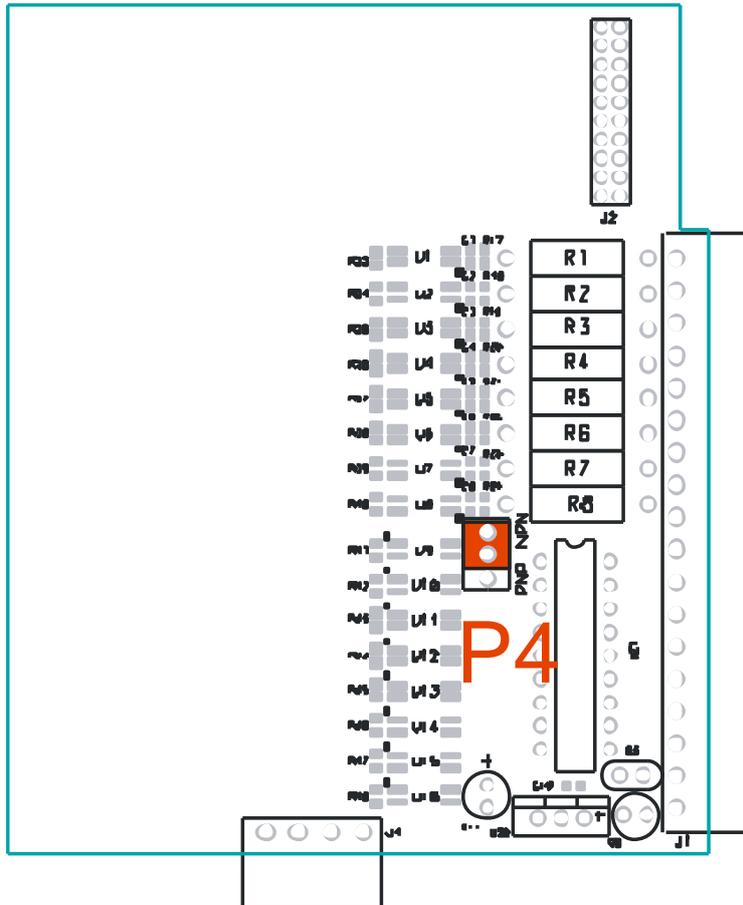
4-26 IO-8DIO-E Jumper for NPN Inputs

4.4.6 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.
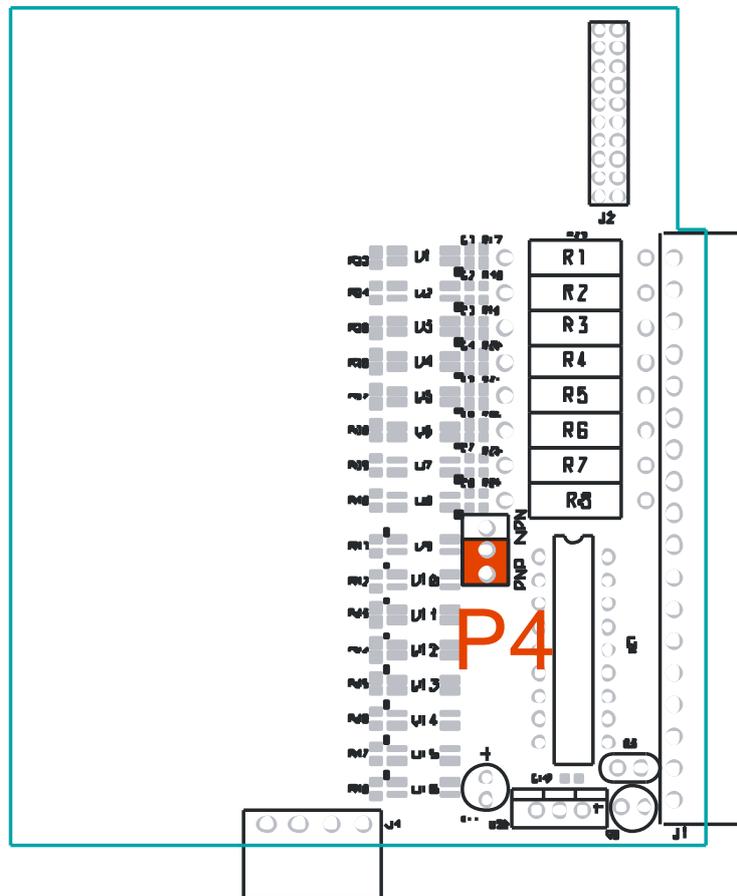
4-27 IO-8DIO-E Jumper for PNP Inputs

4.4.7 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address of the Modbus TCP Module and to enter a Module Description Name and Input Names for identification/maintenance purposes.
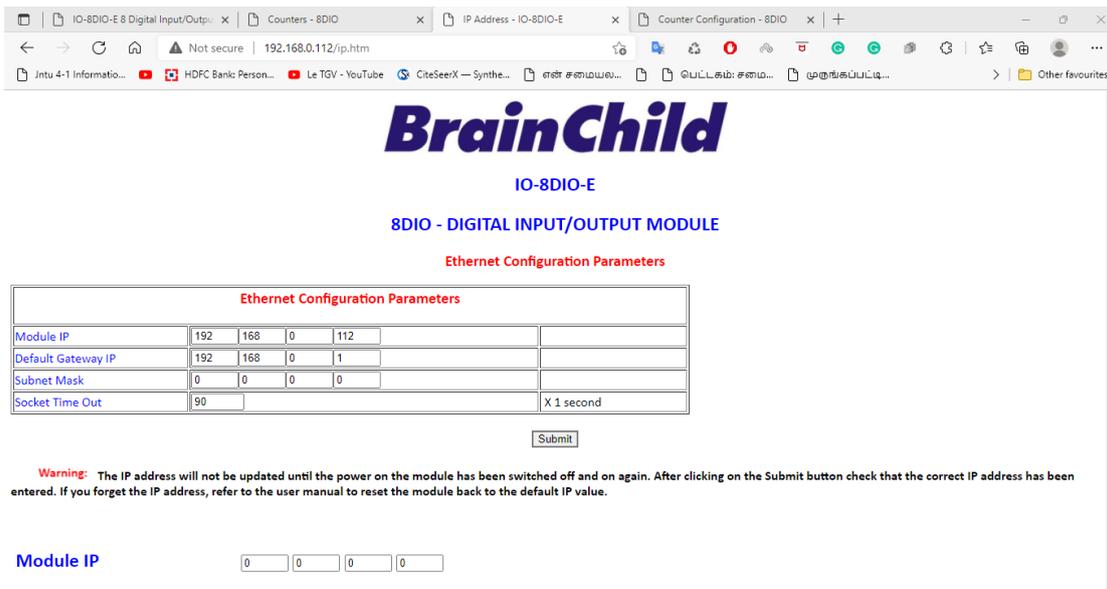
4-28 IO-8DIO-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.

- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Input/Output Names:** These fields allow you to enter an input description name into the Modbus 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 "**192.168.0.112/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.
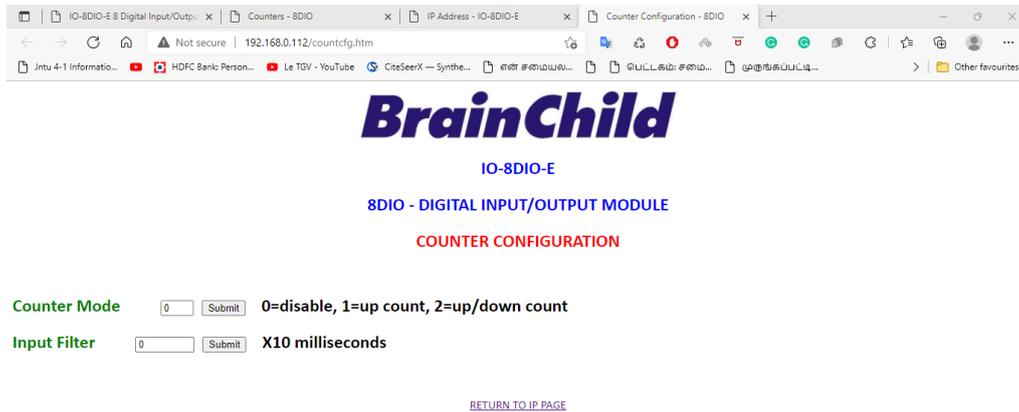
4-29 IO-8DIO-E Web Page Counter Configuration

- **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.

4.4.8 Viewing web pages

To view the default Web page in the Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.
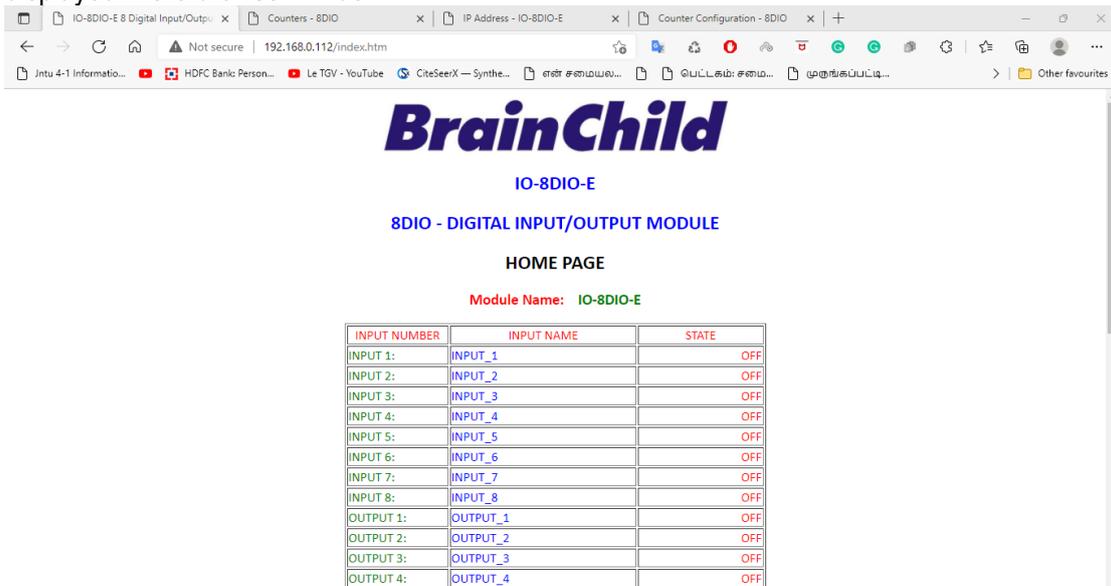
4-30 IO-8DIO-E Web Page View -I/O Status

- **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 at 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.
- **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 Modbus TCP Module, start the Web browser and type "**192.168.0.112/counter.htm**" into the address line of the browser window.
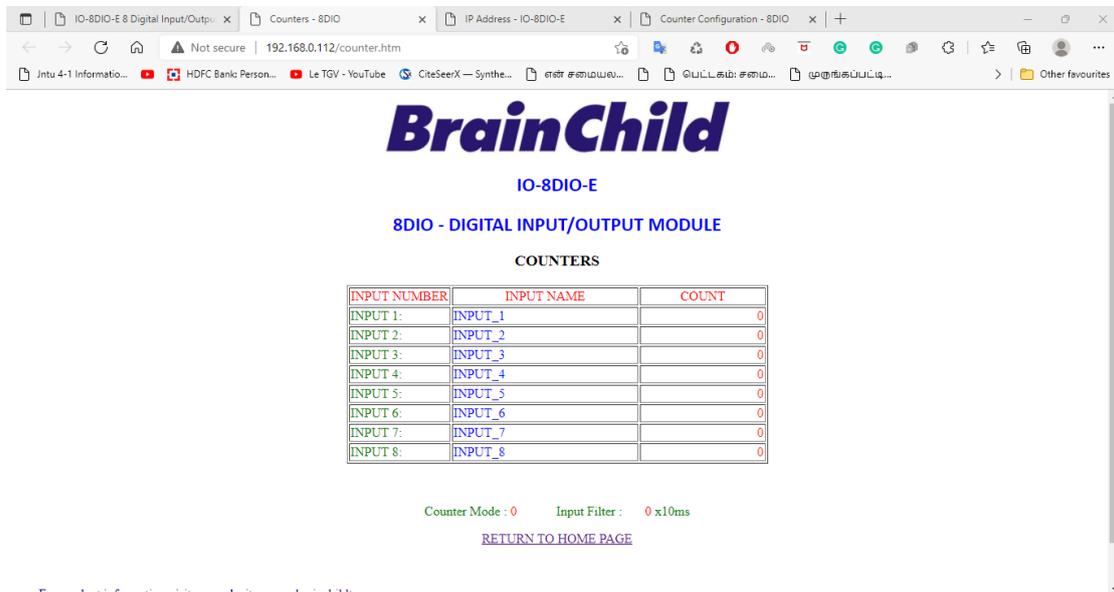
4-31 IO-8DIO-E Web Page View -Counter Status

- **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.

4.4.9 IO-8DIO-E Modbus Mapping (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	"

Modbus Address	Register Name	Low Limit	High Limit	Access	Comments
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)

4-11 IO-8DIO-E Modbus Mapping

4.4.9.1 Digital Input Register.

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

MSB								IO-8DIO-E DIGITAL INPUTS							LSB	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	ADDRESS
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

4-12 IO-8DIO-E Digital Input Register

4.4.9.2 Digital Output Register.

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

MSB								IO-8DIO-E DIGITAL OUTPUTS							LSB	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	ADDRESS
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

4-13 IO-8DIO-E Digital Output Register

4.4.9.3 Counter Registers.

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

Counter High Value (MSB) = Register 40003.
Counter Low Value (LSB) = Register 40004.
Counter Value = (Counter High Value X 65535) + Counter Low Value.

4.4.9.4 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.

4.5 IO-8AIIS-E – 8 Channel Isolated Analog Current Inputs

4.5.1 Description

The IO-8AIIS-E 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.

4-32 IO-8AIIS-E

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 IO-8AIIS-E 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 IO-8AIIS-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-8AIIS-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm and the address for viewing the configuration data is http://192.168.0.112/tconfig.htm.

The web page address for configuring the module is http://192.168.0.112/ip.htm .

4.5.2 Technical Specification of IO-8AIIS-E

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
	Input Type	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.

*4-14 IO-8AIIS-E Specifications*

4.5.3 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.
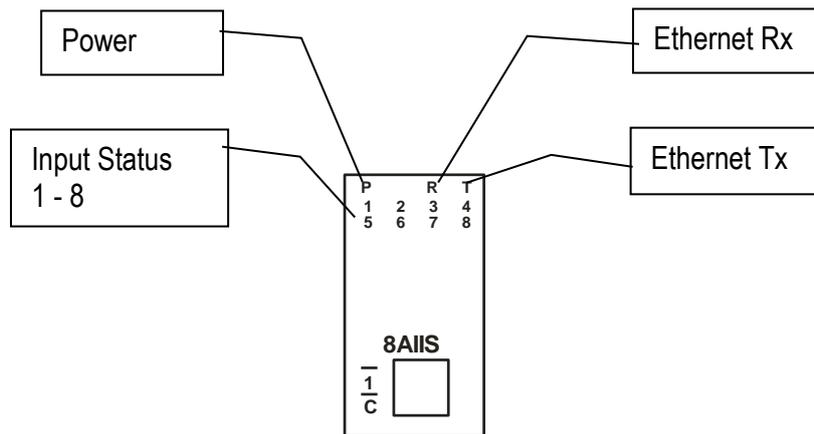
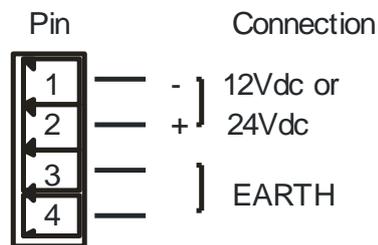

4-33 IO-8AIIS-E Status Indicators

4.5.4 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.
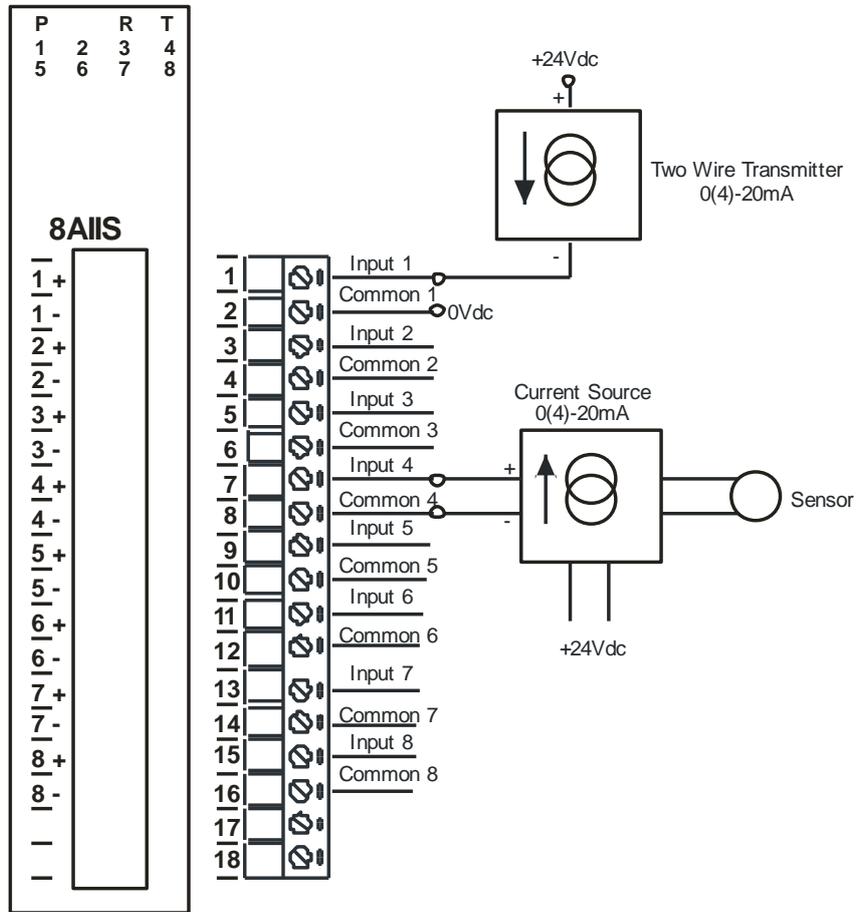
4-34 IO-8AIIS-E Input Wiring

The following diagram shows the wiring for the power.

4-35 IO-8AIIS-E Power Wiring

4.5.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address, default gateway and subnet mask of the Modbus TCP Module, select the Input type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.
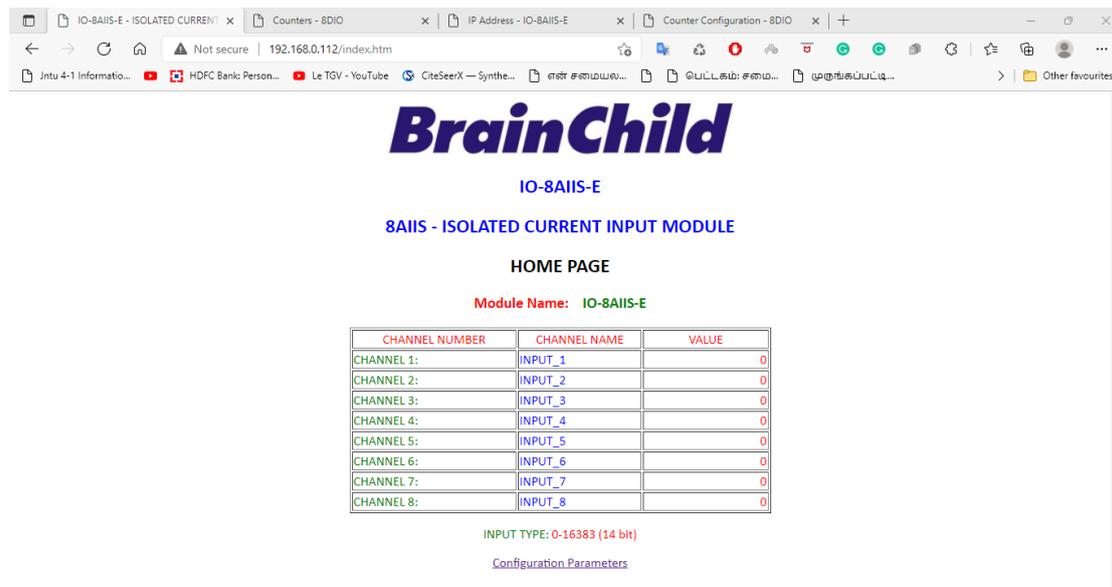

4-36 IO-8AIIS-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular input by name or number.

4.5.6 Viewing web pages

To view the default Web page in the Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.

4-37 IO-8AIIS-E Web Page View- Input Status

- **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 Modbus TCP Module, start the Web browser and type "**192.168.0.112/tconfig.htm**" into the address line of the browser window.

Configuration × Counters - 8DIO × IP Address - IO-8AIIS-E × Counter Configuration - 8DIO × +

← → C ⌂ ⚠ Not secure | 192.168.0.112/tconfig.htm

Jntu 4-1 Informatio... HDFC Bank: Person... Le TGV - YouTube CiteSeerX — Synthe... எனா சமையல... பெட்டகம்: சமை... முறுங்கப்பட்டி... > Other favourites

BrainChild

IO-8AIIS-E

8AIIS - ISOLATED CURRENT INPUT MODULE

CONFIGURATION PAGE

INPUT TYPE	0-16383 (14 bit)

RETURN TO HOME PAGE

4-38 IO-8AIIS-E Web Page View- Input Type

- **Input Type:** This is the format that the module has been configured to operate with.

4.5.7 IO-8AIIS-E Modbus Mapping (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.

4-15 IO-8AIIS-E Modbus Mapping

4.5.7.1 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					IO-8AIIS-E ANALOG INPUTS								LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	ADDRESS
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

Analog Input: 12 Bit Value (0 - 4095)

4-16 IO-8AIIS-E Analog Input Register
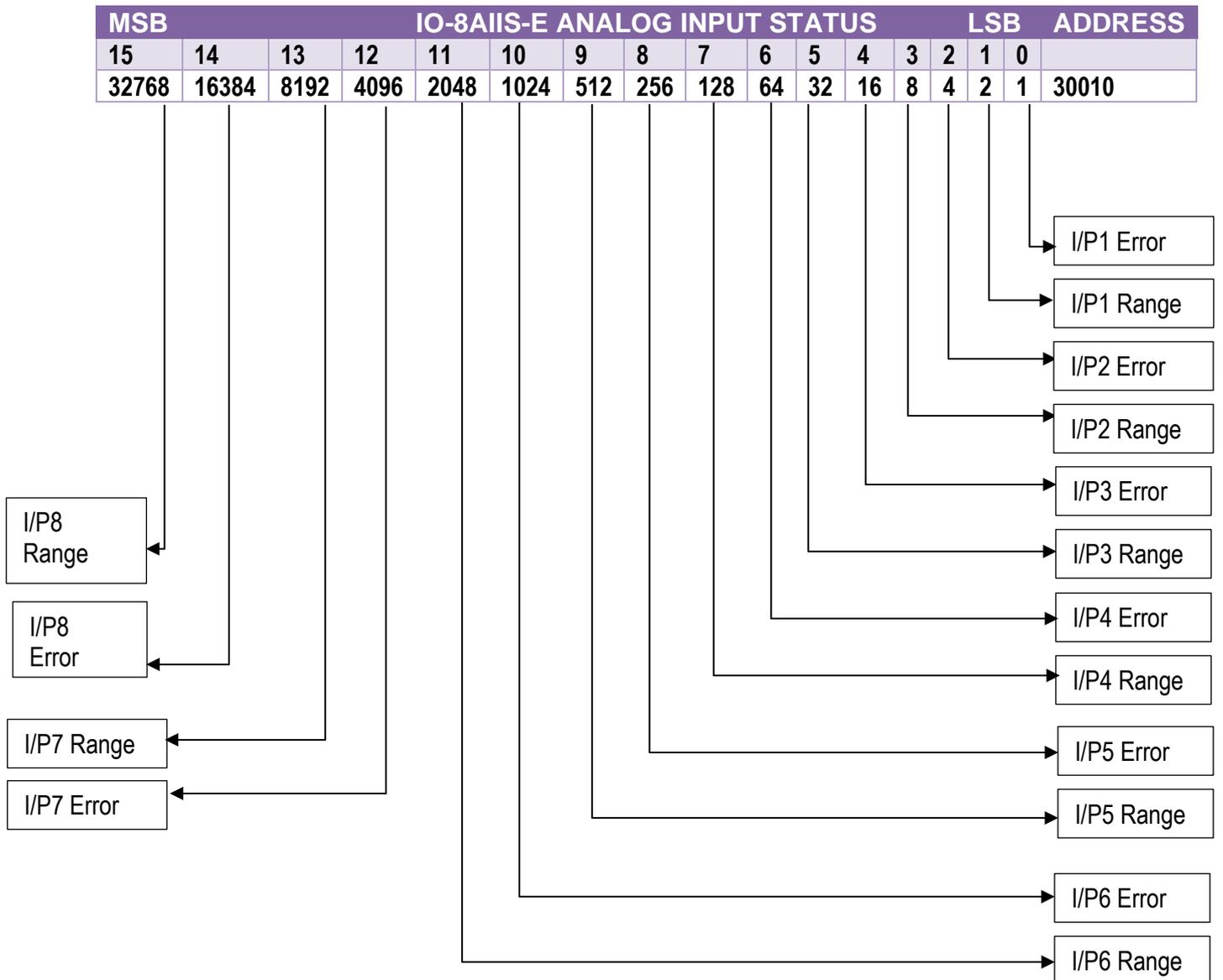
4.5.7.2 Analog Input Status.

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

Page 55 of 142

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, i.e.:

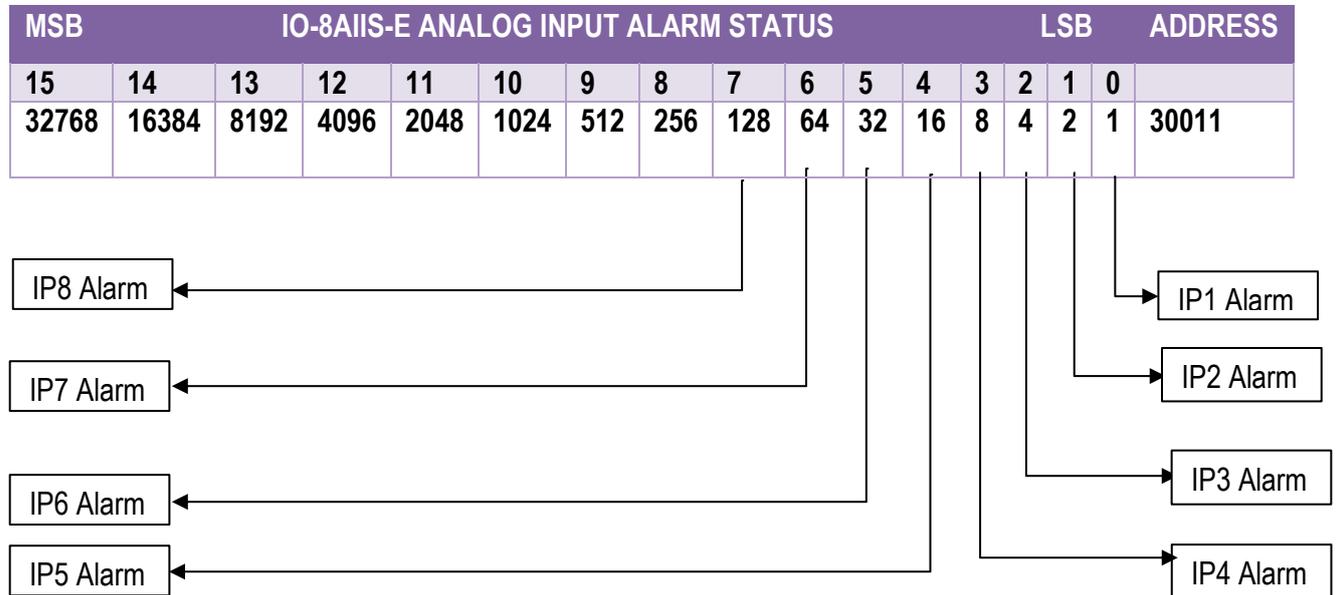| Bit 1- Error	Bit 2-Range	Condition	Status LED
0	don't care	Input working OK.	(LED OFF)
1	0	Input Open circuit or zero.	(LED ON)
1	1	Input Over range.	(LED FLASH)

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

MSB					IO-8AIIS-E 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

I/P8 Range
I/P8 Error
I/P7 Range
I/P7 Error

I/P1 Error
I/P1 Range
I/P2 Error
I/P2 Range
I/P3 Error
I/P3 Range
I/P4 Error
I/P4 Range
I/P5 Error
I/P5 Range
I/P6 Error
I/P6 Range

4-17 IO-8AIIS-E Analog Input Status

4.5.7.3 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				IO-8AIIS-E 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

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

4-18 IO-8AIIS-E Analog Input Alarm Status

4.6 IO-8AIVS-E – 8 Channel Isolated Analog Voltage Inputs

4.6.1 Description

The IO-8AIVS-E 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.

4-39 IO-8AIVS-E

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 IO-8AIVS-E 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 IO-8AIVS-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-8AIVS-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm and the address for viewing the configuration data is http://192.168.0.112/tconfig.htm.

The web page address for configuring the module is http://192.168.0.112/ip.htm .

4.6.2 Technical Specification of IO-8AIVS-E

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

4-19 IO-8AIVS-E Specifications

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 10V.
                    "Flashing" when the input is over range, greater or equal to 10V.
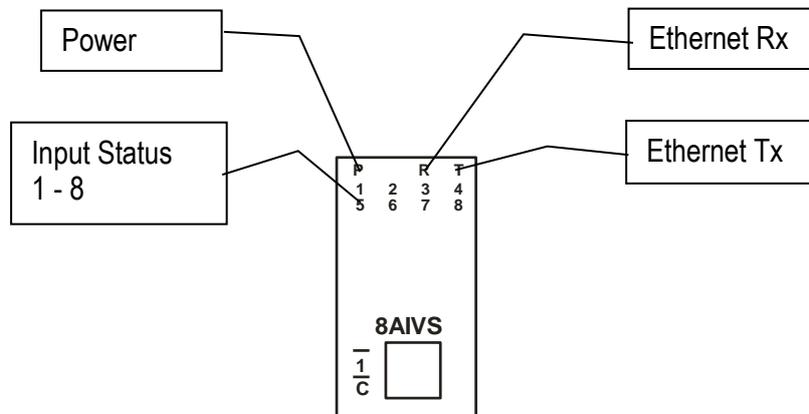
4-40 IO-8AIVS-E Status Indicators

4.6.4 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.
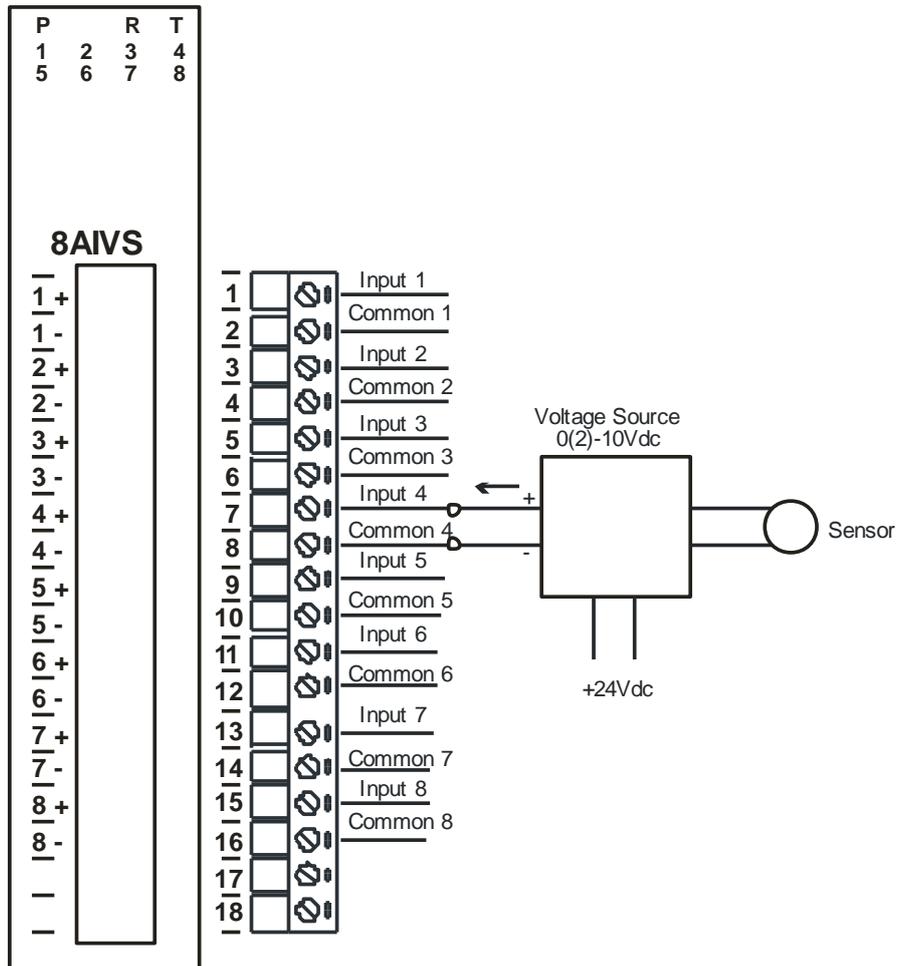
4-41 IO-8AIVS-E Input Wiring

The following diagram shows the wiring for the power.
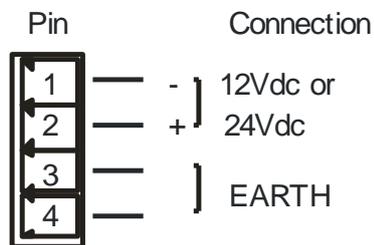
4-42 IO-8AIVS-E Power Wiring

4.6.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address, default gateway and subnet mask of the Modbus TCP Module, select the Input type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.

4-43 IO-8AIVS-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the Modbus 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 Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.

4-44 IO-8AIVS-E Web Page View- Input Status

- **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 Modbus TCP Module, start the Web browser and type "**192.168.0.112/tconfig.htm**" into the address line of the browser window.

4-45 IO-8AIVS-E Web Page View- Input Type

- **Input Type:** This is the format that the module has been configured to operate with.

4.6.7 IO-8AIVS-E Modbus Mapping (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.

4-20 IO-8AIVS-E Modbus Mapping

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					IO-8AIVS-E ANALOG INPUTS								LSB			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	ADDRESS
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)

4-21 IO-8AIVS-E Analog Input Register

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 0-10V, 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, i.e.:

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								IO-8AIVS-E 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

I/P1 Error
I/P1 Range
I/P2 Error
I/P2 Range
I/P3 Error
I/P3 Range
I/P4 Error
I/P4 Range
I/P5 Error
I/P5 Range
I/P6 Error
I/P6 Range
I/P7 Range
I/P7 Error
I/P8 Error
I/P8 Range
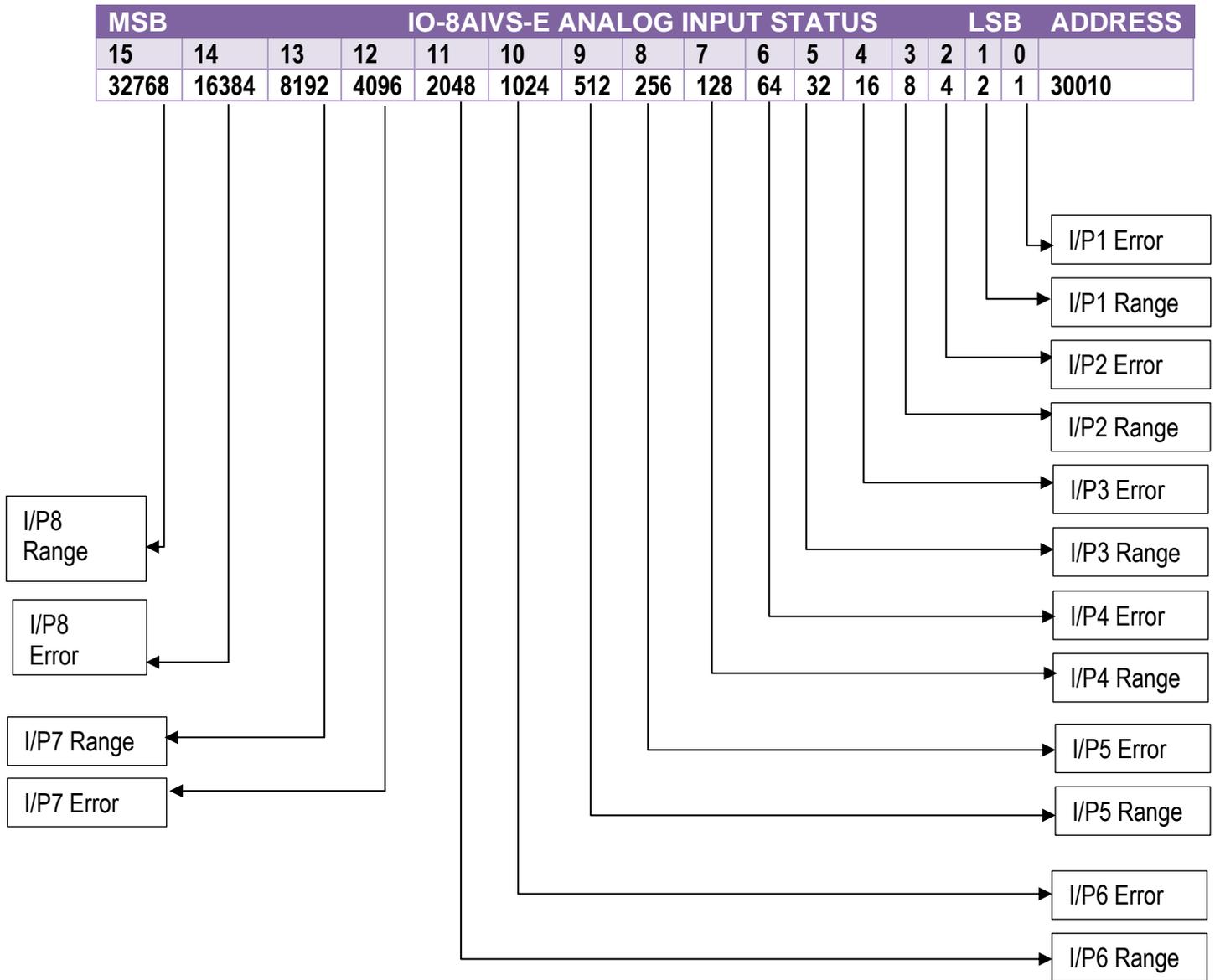
4-22 IO-8AIVS-E Analog Input Status

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 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				IO-8AIVS-E 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

IP8 Alarm

IP7 Alarm

IP6 Alarm

IP5 Alarm

IP1 Alarm

IP2 Alarm

IP3 Alarm

IP4 Alarm
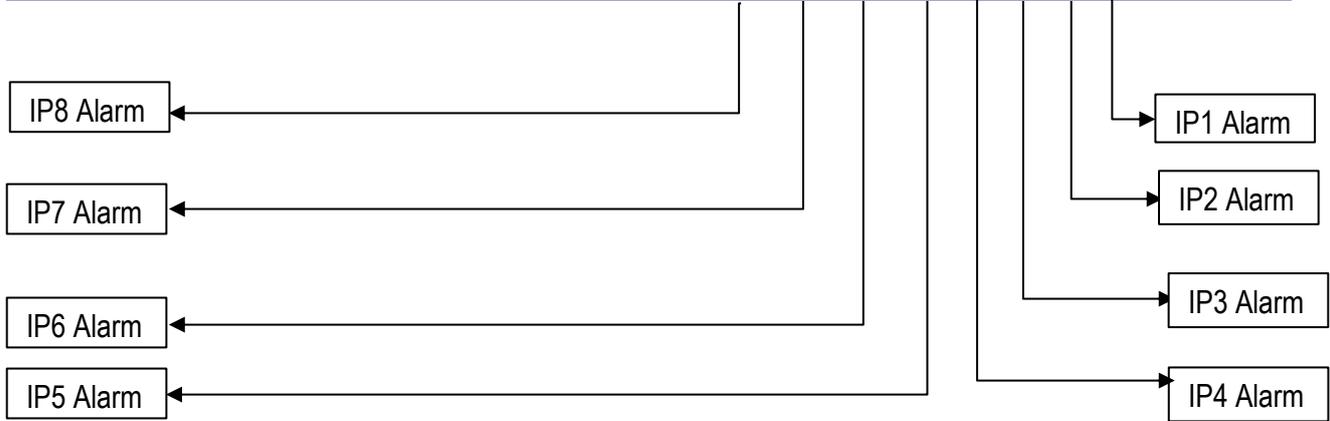
4-23 IO-8AIVS-E Analog Input Alarm Status

4.7 IO-8TCS-E – 8 Channel Isolated Thermocouple Inputs

4.7.1 Description

The IO-8TCS-E 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.

4-46 IO-8TCS-E

The thermocouple voltage is read by the module circuitry, linearized and converted to °C. 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 °C to 0.1°C resolution. i.e.: 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 IO-8TCS-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-8TCS-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm and the address for viewing the configuration data is http://192.168.0.112/tconfig.htm.

The web page address for configuring the module is http://192.168.0.112/ip.htm .

4.7.2 Technical Specification of IO-8TCS-E

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.	

4-24 IO-8TCS-E Specifications

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 thermocouple is open circuit.
"OFF" when the thermocouple is connected.
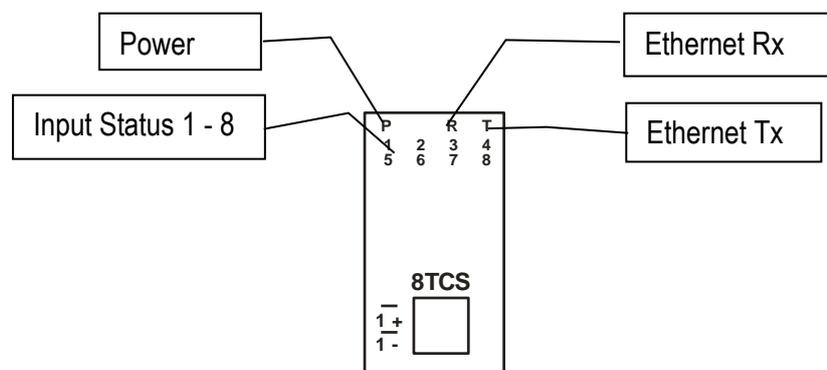
4-47 IO-8TCS-E Status Indicators

4.7.4 Wiring
The following diagram shows how the inputs are connected to a thermocouple.
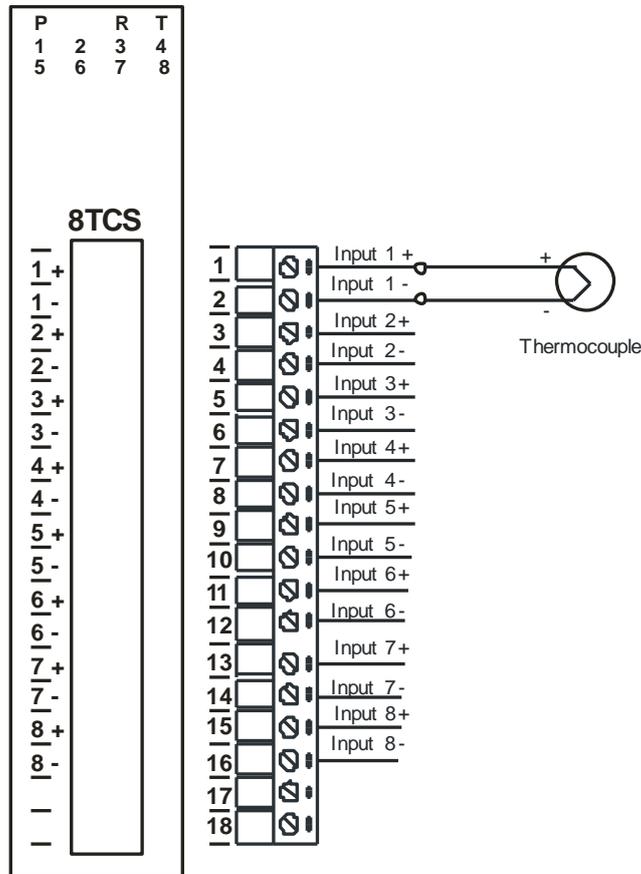
4-48 IO-8TCS-E Input Wiring

The following diagram shows the wiring for the power.
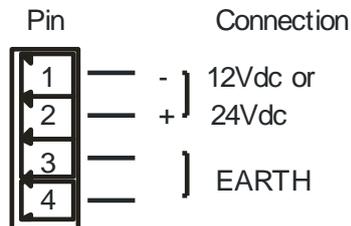
4-49 IO-8TCS-E Power Wiring

4.7.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address of the Modbus TCP Module, select the TC type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.

4-50 IO-8TCS-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the Modbus 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 Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.

4-51 IO-8TCS-E Web Page View- Input Status

- **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 Modbus TCP Module, start the Web browser and type "**192.168.0.112/tconfig.htm**" into the address line of the browser window.

4-52 IO-8TCS-E Web Page View- Input Type

- **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

4.7.7 IO-8TCS-E Modbus Mapping (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) Up to and including SW V2.0
40104	Units Type	1	2	R/W	1=°C, 2=°F
40105	CJC Offset 1	1	199	R/W	100 = zero offset (0.0) SW V3.0 onwards
40106	CJC Offset 2	1	199	R/W	100 = zero offset (0.0)
40107	CJC Offset 3	1	199	R/W	100 = zero offset (0.0)
40108	CJC Offset 4	1	199	R/W	100 = zero offset (0.0)
40109	CJC Offset 5	1	199	R/W	100 = zero offset (0.0)
40110	CJC Offset 6	1	199	R/W	100 = zero offset (0.0)
40111	CJC Offset 7	1	199	R/W	100 = zero offset (0.0)
40112	CJC Offset 8	1	199	R/W	100 = zero offset (0.0)

4-25 IO-8TCS-E Modbus Mapping

4.8 IO-6RTD-E – 6 Channel RTD Inputs

4.8.1 Description

The IO-6RTD-E 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.

4-53 IO-6RTD-E

The RTD resistance is read by the module circuitry, linearized and converted to °C. 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 °C to 0.1°C resolution. i.e.: 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 IO-6RTD-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-6RTD-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm
The web page address for configuring the module is http://192.168.0.112/ip.htm .

4.8.2 Technical Specification of IO-6RTD-E

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.		

4-26 IO-6RTD-E Specifications

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 RTD is open circuit.
"OFF" when the RTD is connected.
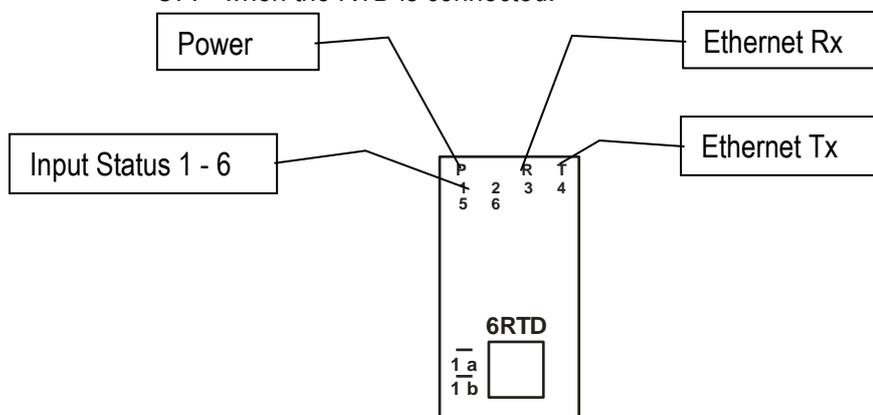
4-54 IO-6RTD-E Status Indicators

4.8.4 Wiring

The following diagram shows how the inputs are connected to a 2 and 3 wire RTD.
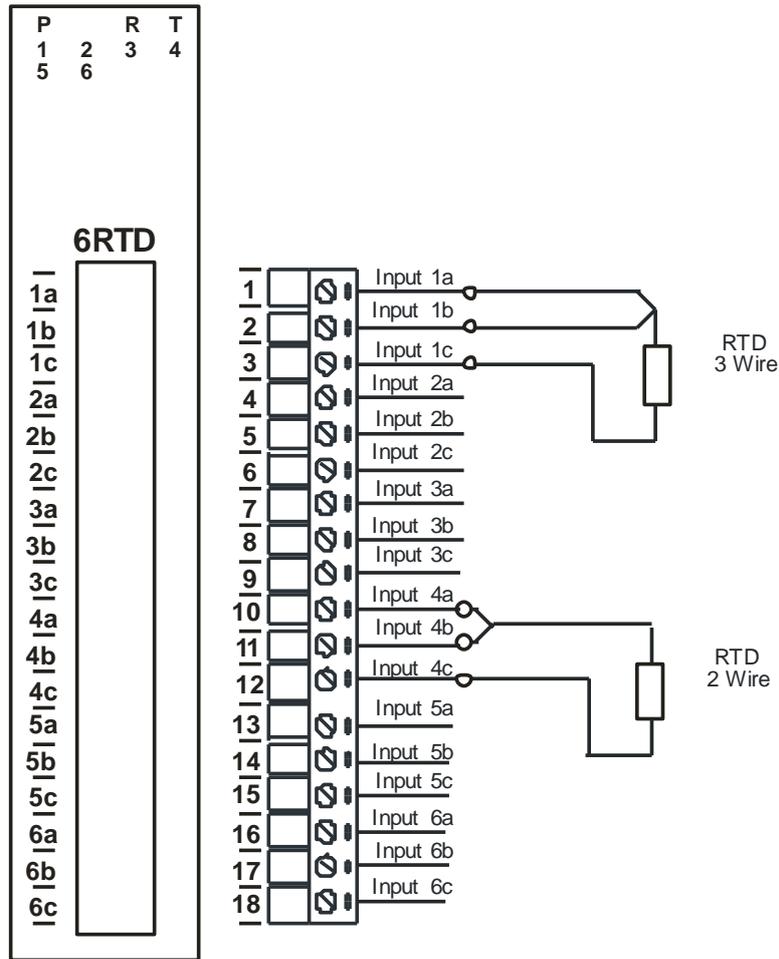
4-55 IO-6RTD-E Input Wiring

The following diagram shows the wiring for the power.
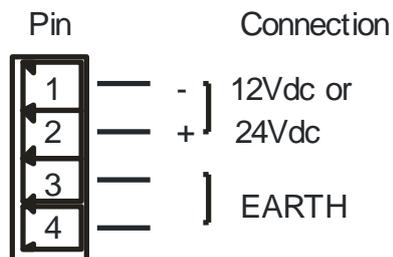
4-56 IO-6RTD-E Power Wiring

4.8.5 Configuration

The Web page address "**192.168.0.112/ip.htm**" is entered into the address line of the browser window to access the configuration page. This page allows the user to change the IP address of the Modbus TCP Module, select the RTD type, and to enter a Module Description Name and Input Names for identification/maintenance purposes.

4-57 IO-6RTD-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Input Names:** These fields allow you to enter an input description name into the Modbus 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 Modbus TCP Module, start the Web browser and type "192.168.0.112" into the address line of the browser window. The main page will now be displayed in the browser window.
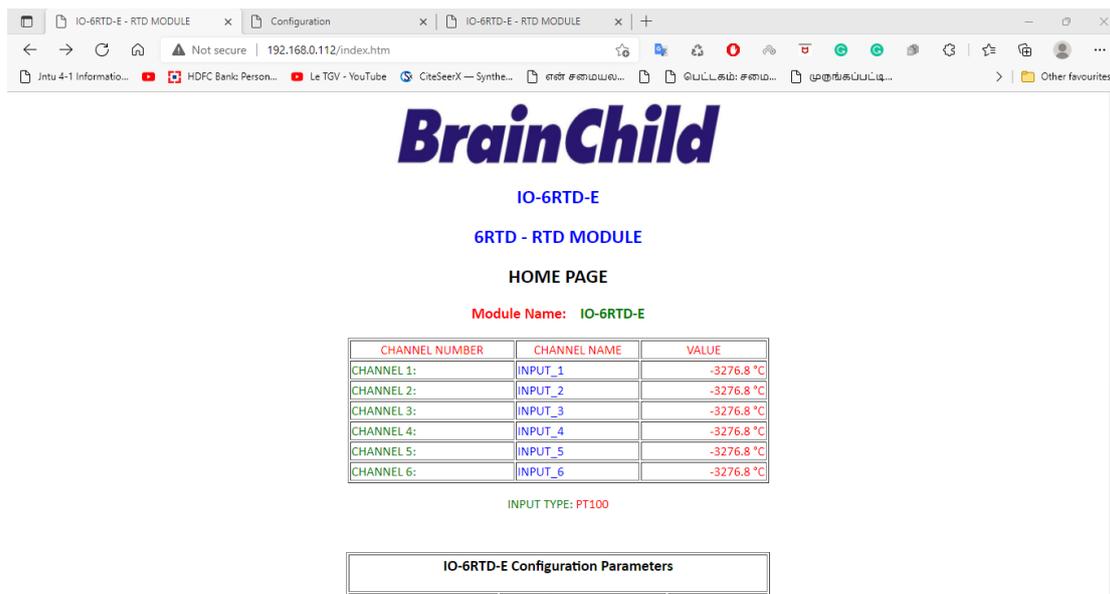
4-58 IO-6RTD-E Web Page View- Input Status

- **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.

4.8.7 IO-6RTD-E Modbus Mapping (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	RTD Inputs. See table for range.
30003	RTD Input 2	-xxx.x	yyyy.y	R	Resolution in 0.1°C.
30004	RTD Input 3	-xxx.x	yyyy.y	R	"
30005	RTD Input 4	-xxx.x	yyyy.y	R	"
30006	RTD Input 5	-xxx.x	yyyy.y	R	"
30007	RTD Input 6	-xxx.x	yyyy.y	R	"
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

4-27 IO-6RTD-E Modbus Mapping

4.8.7.1 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:
The analog input status can be read in a single register as follows:
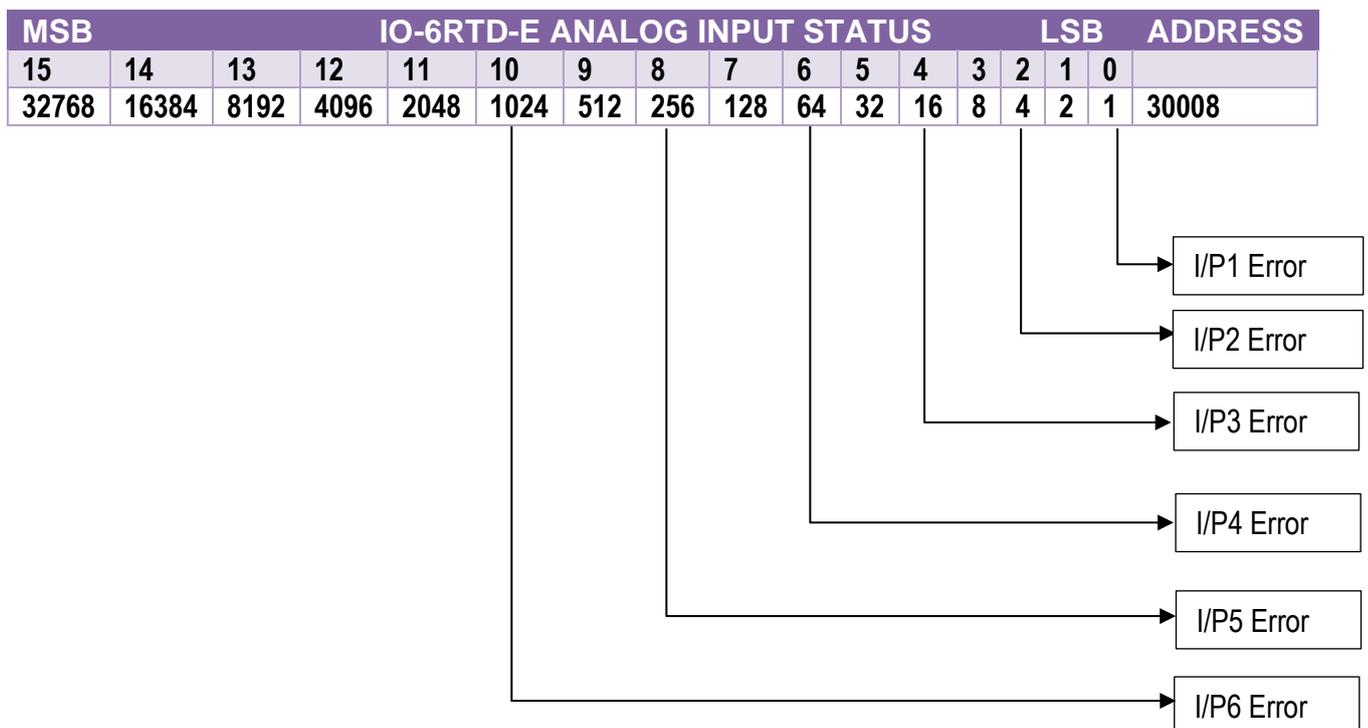
4-28 IO-6RTD-E Analog Input Status

4.9 IO-8AOI-E – 8 Channel Analog Outputs Current

4.9.1 Description

The IO-8AOI-E Module is an 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.

4-59 IO-8AOI-E

Each IO-8AOI-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-8AOI-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. This address must be changed before the module is added to an existing network.

The web page address for viewing the analog output status parameters is http://192.168.0.112/index.htm
The web page address for configuring the module is http://192.168.0.112/ip.htm

4.9.2 Technical Specification of IO-8AOI-E

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.

4-29 IO-8AOI-E Specifications

4.9.3 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.
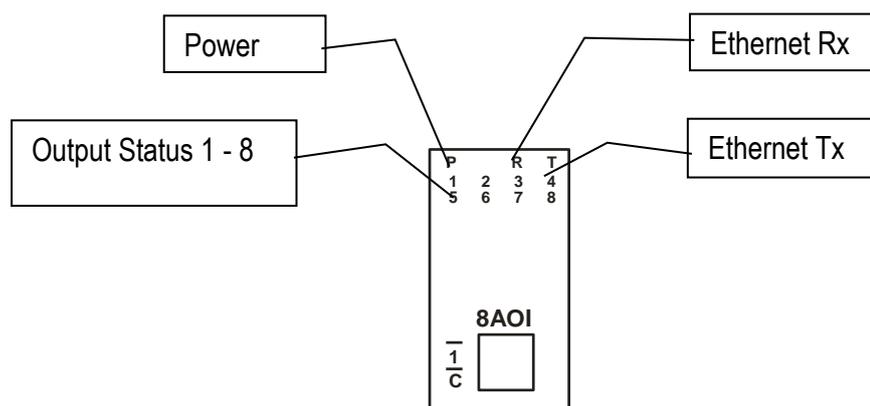
4-60 IO-8AOI-E Status Indicators

4.9.4 Wiring

The following diagram shows how the analog outputs are connected to a load.
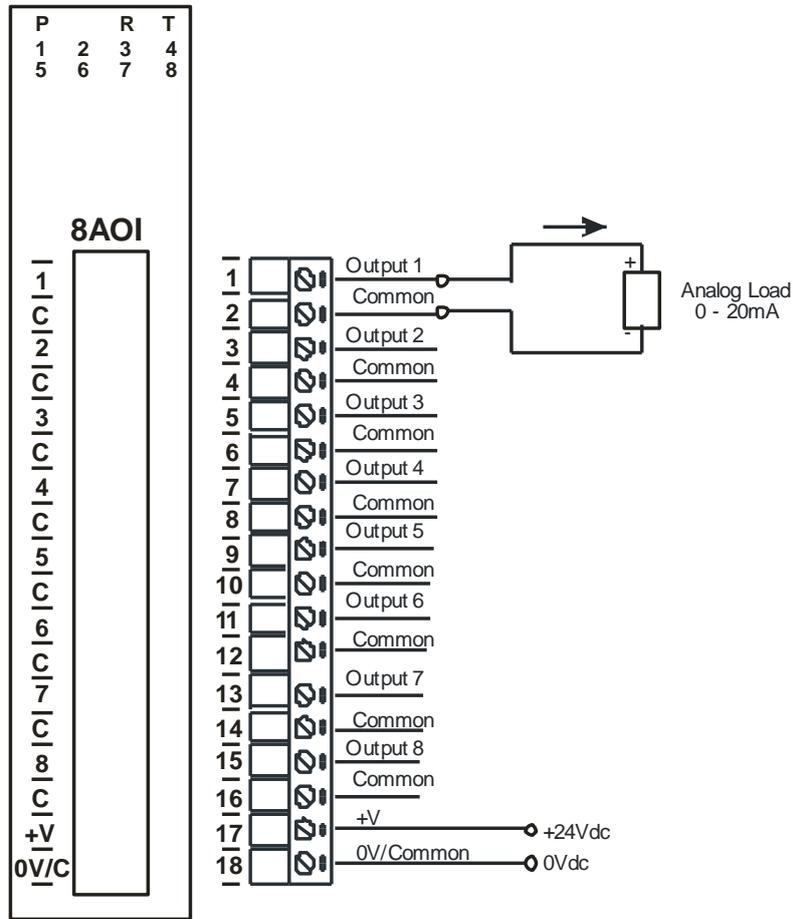
4-61 IO-8AOI-E Output Wiring

The following diagram shows the wiring for the power.
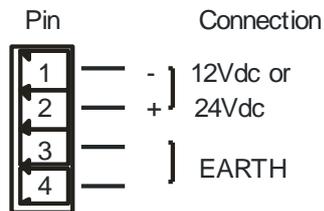
4-62 IO-8AOI-E Power Wiring

4.9.5 Configuration

The Web page address "**192.168.0.112/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 Modbus TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.

4-63 IO-AOI-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Output Names:** These fields allow you to enter an output description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the particular output by name or number.

4.9.6 Viewing web pages

To view the default Web page in the Modbus TCP Module, start the Web browser and type "**192.168.0.112/index.htm**" into the address line of the browser window. The main page will now be displayed in the browser window.

4-64 IO-8AOI-E Web Page View- Output Status

- **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.

4.9.7 IO-8AOI-E Modbus Mapping (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.

4-30 IO-8AOI-E Modbus Mapping

4.10   IO-8AOV-E – 8 Channel Analog Output Voltage

4.10.1 Description

The IO-8AOV-E 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.

4-65 IO-8AOV-E

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 IO-8AOV-E Module has a unique Ethernet IP address which must be programmed into the PC or PLC. The IP address in the IO-8AOV-E Module is configured via the Web Server. Any standard Web browser such as Internet Explorer can be used to access the web pages where configuration is carried out. The modules are factory programmed with a default IP address of 192.168.0.112. 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://192.168.0.112/index.htm
The web page address for configuring the module is http://192.168.0.112/ip.htm

4.10.2 Technical Specification of IO-8AOV-E

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.

4-31 IO-8AOV-E Specifications

4.10.3 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.
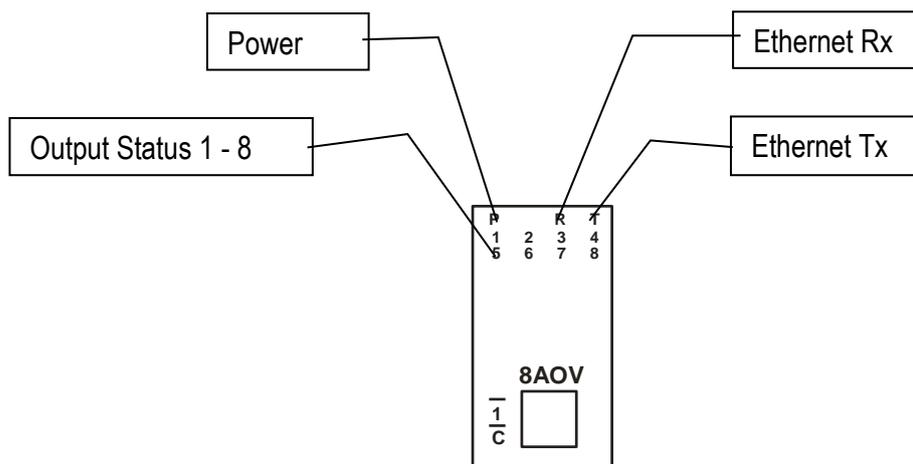
4-66 IO-8AOV-E Status Indicators

4.10.4 Wiring

The following diagram shows how the analog outputs are connected to a load.
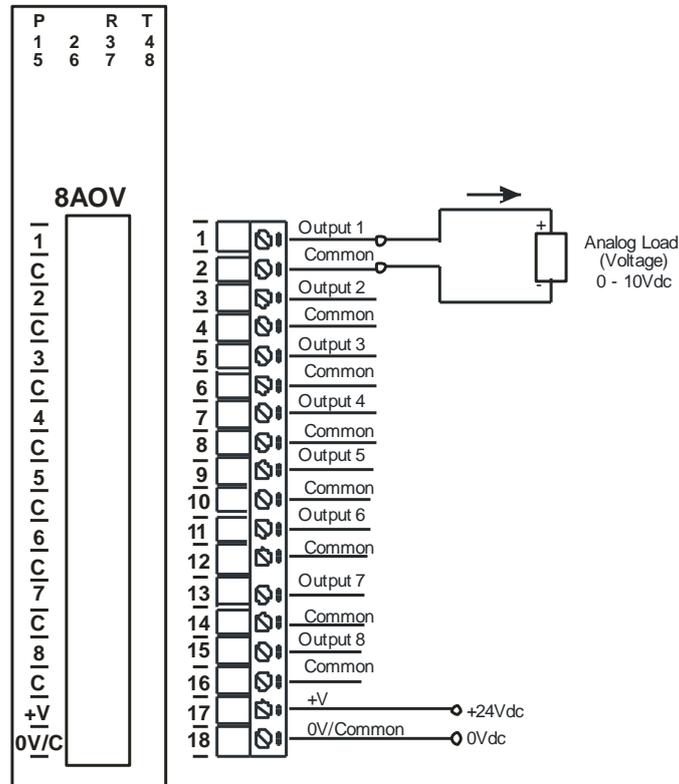
4-67 IO-8AOV-E Output Wiring

The following diagram shows the wiring for the power.
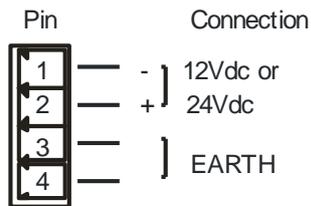
4-68 IO-8AOV-E Power Wiring

4.10.5 Configuration

The Web page address "**192.168.0.112/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 Modbus TCP Module and to enter a Module Description Name and Output Names for identification/maintenance purposes.

4-69 IO-AOV-E Web Page Configuration

- **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 Modbus TCP module. When the value is set to one "1", the Modbus registers are reconfigured to match the format of the Modbus TCP modules. This is useful if a new Modbus TCP module is being used to replace an old Modbus TCP module in an existing system.
- **Module Name:** This field allows you to enter a module description name into the Modbus TCP Module. This is an identifier for diagnostic/maintenance purposes and is chosen to best describe the Modbus TCP Module in the system by name or number.
- **Output Names:** These fields allow you to enter an output description name into the Modbus 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 Modbus TCP Module, start the Web browser and type "**192.168.0.112/index.htm**" into the address line of the browser window. The main page will now be displayed in the browser window.
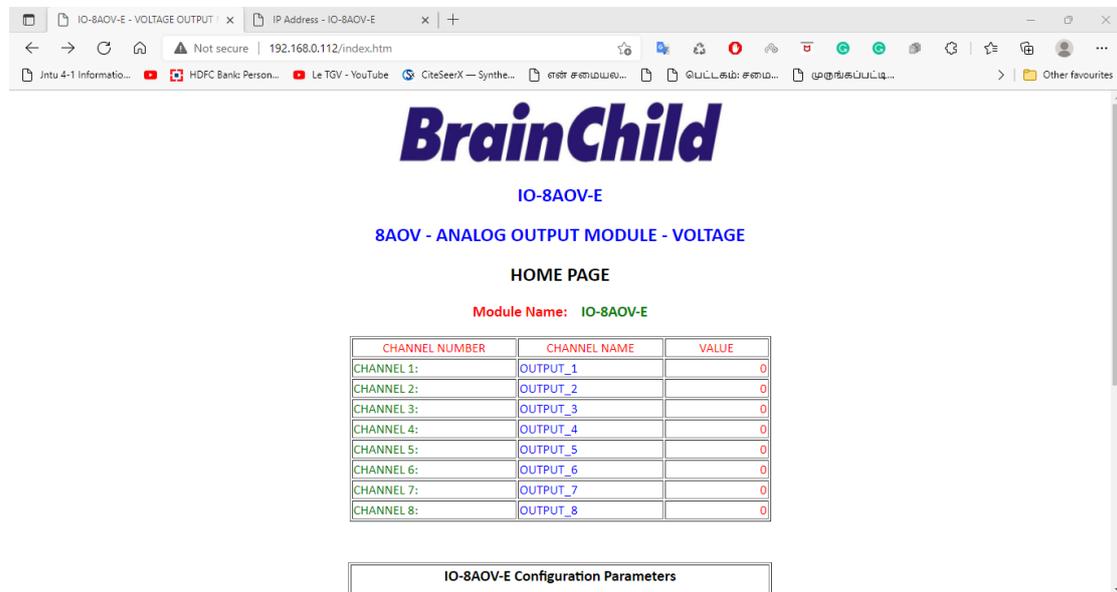
4-70 IO-8AOV-E Web Page View- Output Status

- **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 IO-8AOV-E Modbus Mapping (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.

4-32 IO-8AOV-E Modbus Mapping

5 PC Software

The PC Software can be used for configuration of the IO Module, real-time monitoring and logging of data, viewing and analyzing of historical data There are 2 software available for these functions as listed below.

1. IO Studio- For Configuration & Real-time Monitoring
2. Data Acquisition Studio- Real -time monitoring and logging, Historical data analysis (Real Time Viewer + Historical Viewer)

5.1 IO Studio

This is a free software provided for configuring the IO module and monitoring the real-time data from the IO module.

5.1.1 IO Studio Software Installation

The IO Studio installation will install the software on the PC.

5.1.1.1 System Requirements

Item	Minimum Requirements
System	IBM PC compatible computer with Intel Pentium IV or above
Operating System	Windows XP or above
Memory	1 GB
Hard Disk	50 GB Free Space on the hard disk
Communication Ports	RS232 or RS485 or Ethernet Port
Ethernet Port no	502 to be opened

5-1 IO Studio System Requirements

5.1.1.2 Software Installation

IO Studio software can be installed by following the below procedure.

1. Download the IO Studio software form the manufacturer's website.
2. Install the software by running the setup file from the IO Studio folder.
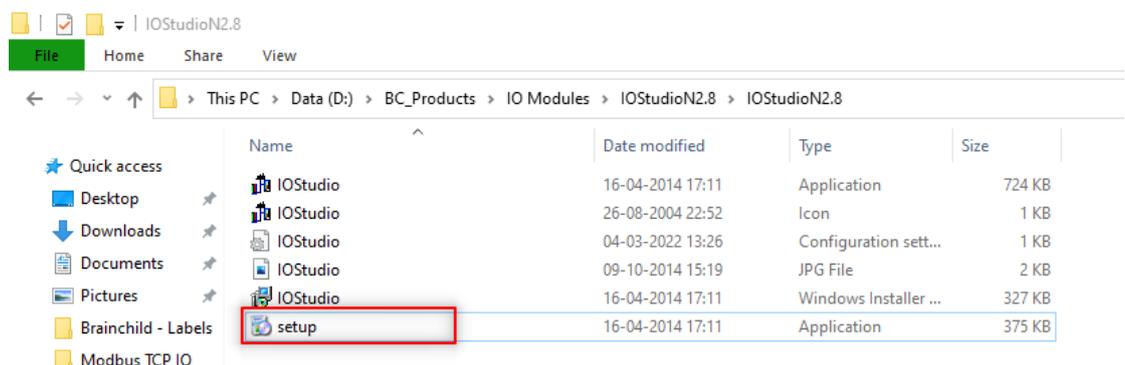
3. Follow the on-screen instructions to install the software.

IOStudio

Welcome to the IOStudio Setup Wizard

The installer will guide you through the steps required to install IOStudio on your computer.

WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.

Cancel   < Back   Next >

IOStudio

Select Installation Folder

The installer will install IOStudio to the following folder.

To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".

Folder:

C:\Program Files (x86)\IOStudio\   Browse...

Disk Cost...

Install IOStudio for yourself, or for anyone who uses this computer:

○ Everyone

◉ Just me

Cancel   < Back   Next >

4. Once the installation is completed the user can see the below confirmation message.
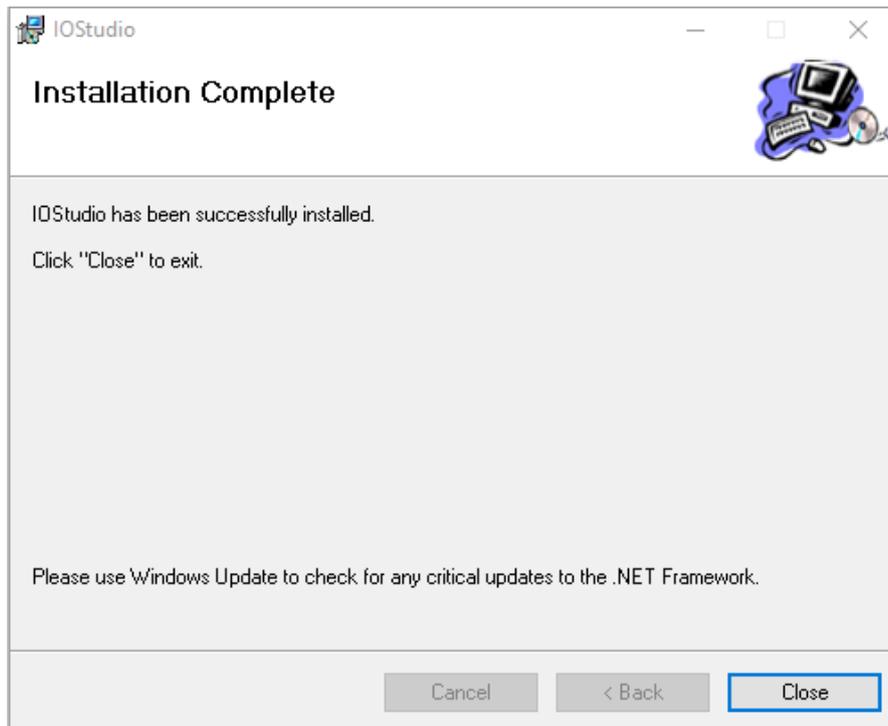
5. After the installation is completed successfully, the shortcut for IO Studio software will be created on the desktop.

6. The structure of IO Studio on the start menu as below.
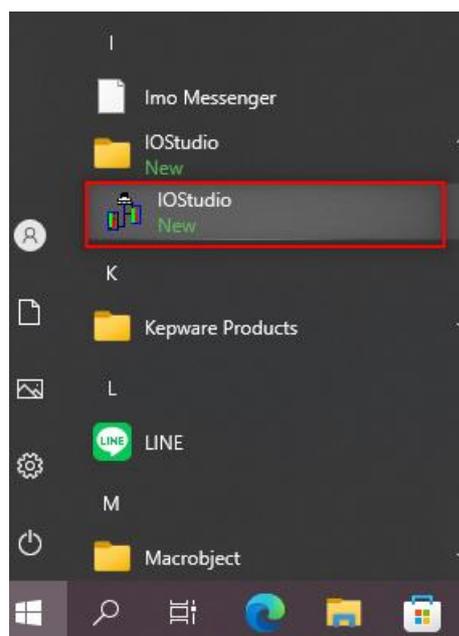
5.1.2 Start and Exit

The IO Studio program can be started by using the shortcut [IOStudio icon] on the desktop or selecting the program IO Studio from the Start menu. The program can be started directly from the IO Studio application on the IO Studio folder without installation.
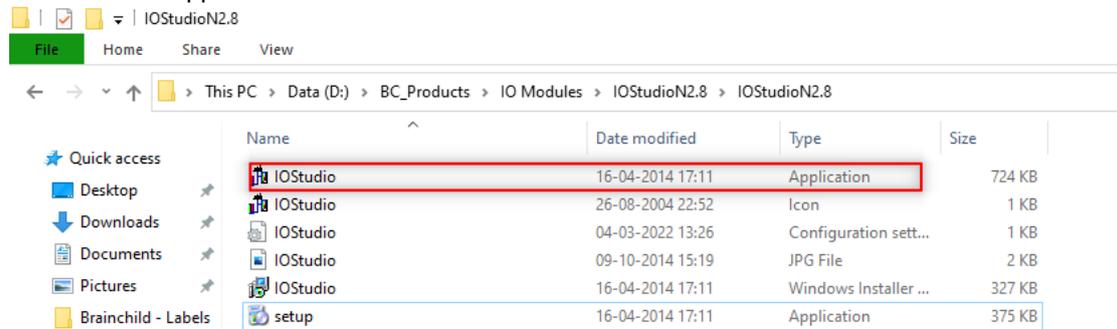
The program can be exit by simply closing the program X symbol on the top right corner of the screen.

5.1.3 Uninstallation of Software

The software can be uninstalled by selecting the uninstall option on the control panel Add or Remove Programs.

5.1.4 IO Studio

Once the IO studio software is started, the below screen will appear.

5.1.4.1 IO Studio -Tool Bar

The IO Studio software has the bellow tools on the tool bar.
- ❖ File
- ❖ About

5.1.4.1.1 File

Below are the sub menu options available in File Menu
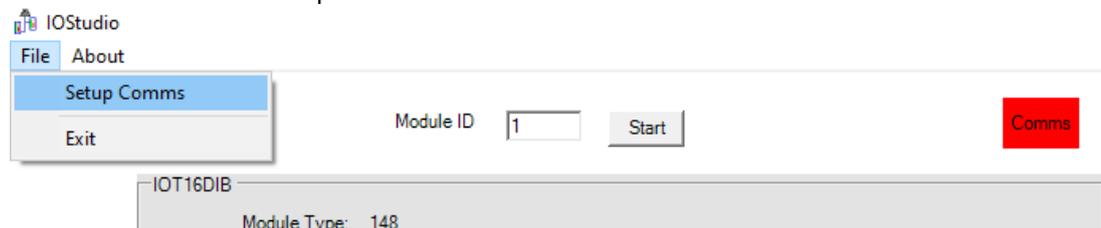
1. **Setup comms:** Set up the communication parameters for the IO module to communicate with the PC.
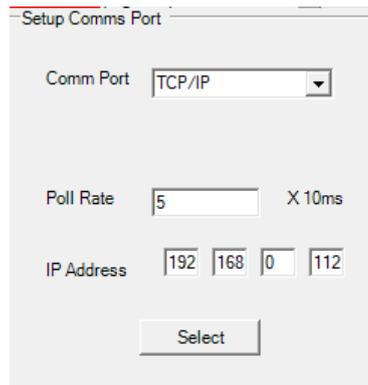
2. **Exit:** Exit or Close the program

5.1.4.1.2 About

Provides information about the software version and the necessary information.
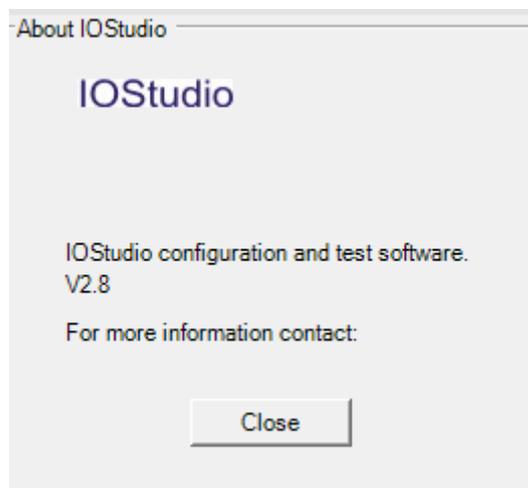
5.1.4.2 IO Module Connection

To connect the IO module with the IO studio software for the configuration follow the below procedure.

- ❖ Connect the IO module with the PC via Ethernet
- ❖ Ensure the PC and the IO module communication is successful using the Ping command for the IP address of the IO module. The default IP address is 192.168.0.112

❖ Open the IO Studio Software and configure the IP address of the IO module the setup communication configuration.
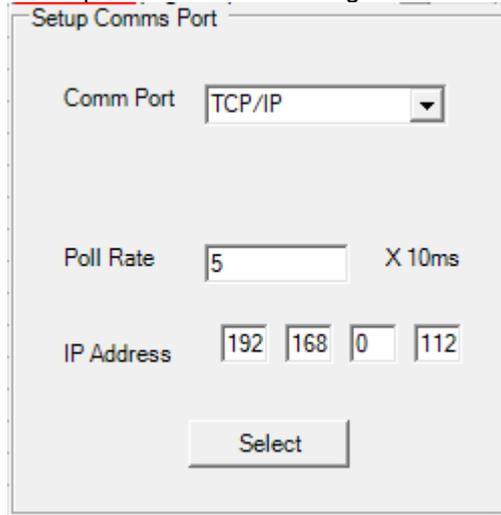
❖ Once the communication is successful the software can read the parameters from the IO module. The user can modify the configuration parameters as per their requirement.

5.2 Data Acquisition Studio Software

The Data Acquisition Studio software (DAQ) consists of Real-time Viewer, Configuration Viewer and Historical Viewer.

5.2.1 Data Acquisition Studio Software Installation

The Data Acquisition Studio installation will install Real-time Viewer, Historical Viewer and Configuration Viewer on the PC.

5.2.1.1 System Requirements

Item	Minimum Requirements
System	IBM PC compatible computer with Intel Pentium IV or above
Operating System	Windows XP or above
Memory	1 GB
Hard Disk	50 GB Free Space on the hard disk
Communication Ports	RS232 or RS485 or Ethernet Port
Others	USB Port or SD Card Slot
License	USB License Key

5.2.1.2 Software Installation

The Data Acquisition Studio software can be installed by following the below procedure.

1. Download the Data Acquisition Studio software form the manufacturer's website.
2. Install latest dot Net software from Microsoft website
3. Install the software by double-clicking the setupwizard.exe from Data Acquisition Studio folder.
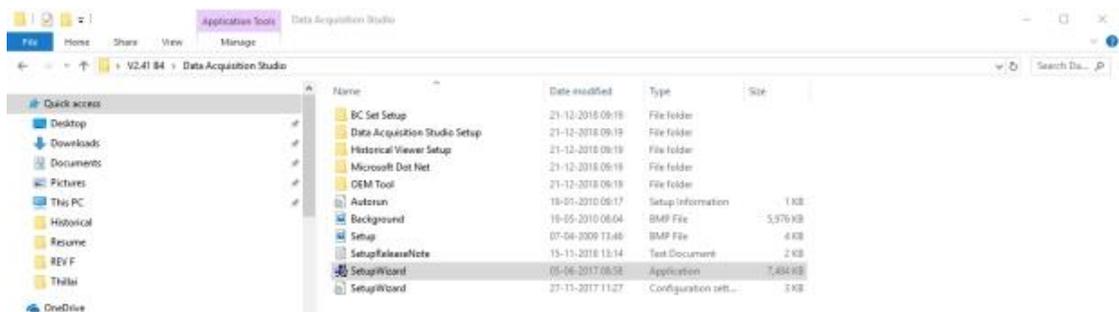
4. Select the language for installation and

5. Select the software components to be installed and select install

6. Follow on-screen instructions to select the installation path and press next to continue the installation.
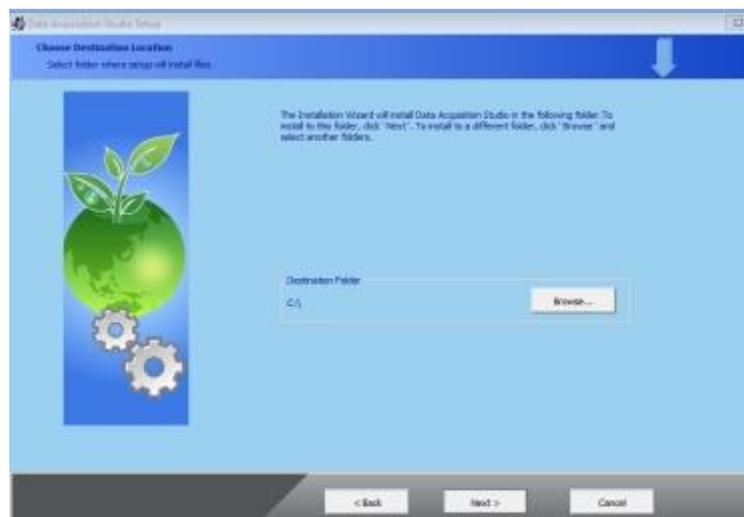
7. Follow onscreen instructions to complete the installation. Once the installation is completed the system will show the installation complete message.
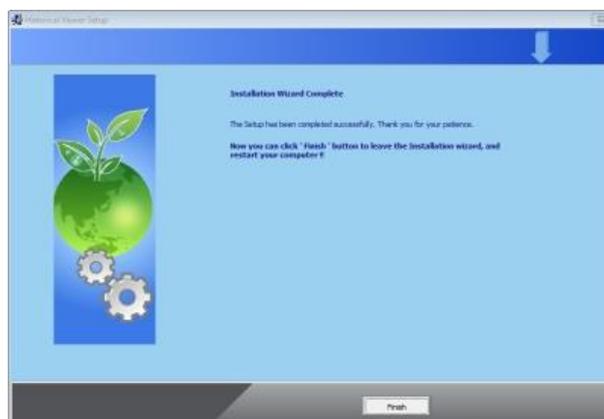
8. After installation is successful, the shortcut for Real-time Viewer and Historical viewer software will be created on the desktop

5.2.1.3 Uninstallation of Software

The software can be uninstalled by selecting the uninstall option on the control panel Add or Remove Programs.

5.2.2 Start and Exit

The Real-time Viewer program can be started by using the shortcut on the desktop or selecting the program Real-time viewer from the start menu.

The program can be exit by simply closing the program X symbol on the top right corner of the screen.

5.2.3 Real-Time Viewer

When running the program first time the initial screen displays like below.

5.2.3.1 Real-Time Viewer – Tool Bar

The real-time viewer has the following toolbars.

- ✓ New
- ✓ Open
- ✓ Save As
- ✓ Display Page Choice
- ✓ Configuration Data'
- ✓ Measured Data
- ✓ Arrange All (Mixed Mode)
- ✓ All Channel Digital
- ✓ Status
- ✓ Auto Page Mode
- ✓ Show Event/Alarm List
- ✓ Digital Mode Display
- ✓ Bar Graph
- ✓ Trend Mode

✓ IO Module Configuration (only for IO Modules)

✓ Controller Configuration (only for Controllers)

✓ Recorder Configuration (only for recorders)

✓ Manually Operate Jobs

✓ Reset Counters of IO Module (only for IO modules)

✓ Mute Alarms

5.2.3.2 Real Time Viewer – Menu Bar

The menu bar consists of 6 menus. They are listed as below.

1. File(F)
2. View(V)
3. Page(P)
4. Window(W)
5. Language(L)
6. Help(H)

5.2.3.2.1 File (F)

The File menu consists of the below sub-menu.

1. **New:** Create a new project.
2. **Open:** Open an existing project.
3. **Save As:** Save the project with a new name.
4. **Close:** Close the current project
5. **Recent:** Open recently opened projects.
6. **Create DDE link in Excel:** Create Dynamic Data Exchange in Excel for real-time values.
7. **Exit:** Exit the program.

5.2.3.2.2 View (V)

The View menu consists of the below sub-menu.
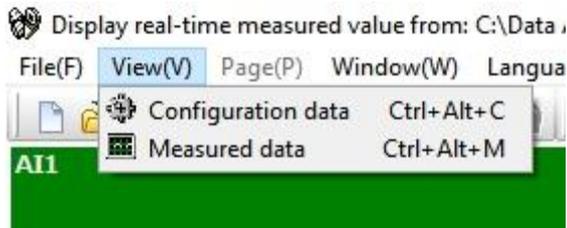
1. **Configuration Data:**   Opens the configuration data of the project.
2. **Measured Data:**   Opens the historical data of the project via Historical Viewer.

5.2.3.2.3 Page (P)

The Page menu consists of the available display pages to select. The user can select the display page to be viewed from the shown list.
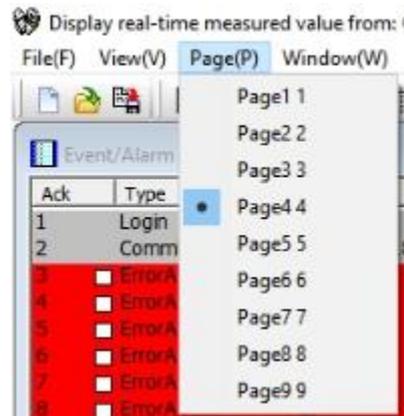
5.2.3.2.4 Window (W)

The Window menu consists of different display modes to select. The user can select the display mode to be viewed from the shown list.
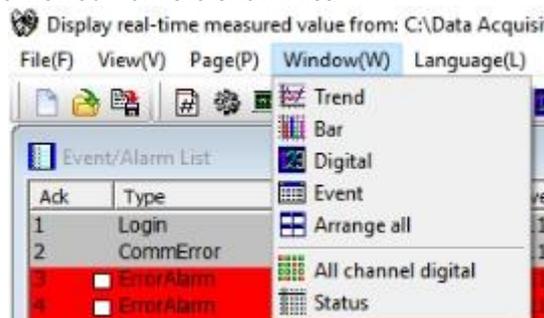
1. **Trend:** Shows the display page in trend mode.
2. **Bar:** Shows the display page in bar graph mode.
3. **Digital:** Shows the display page in digital display mode.
4. **Event:** Shows the Event/ Alarm List display.
5. **Arrange All:** Shows the display page with Trend, Bar Graph, Digital Display and Event/Alarm List.
6. **All Channel Digital:** Shows all the configured channels in the digital mode as an overview.
7. **Status:** Shows the status of counters and Totalizers.

5.2.3.2.5 Language (L)

The display language of the software can be changed by selecting any one of the available languages from the sub-menu.
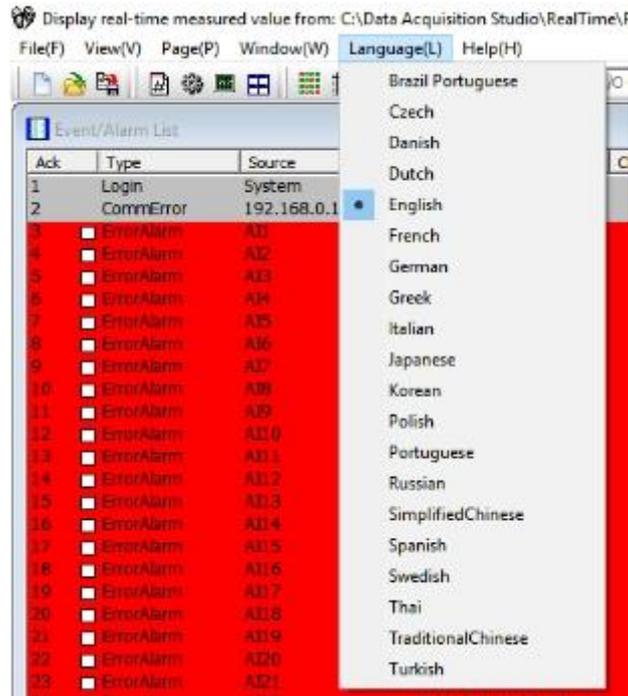
5.2.3.2.6 Help (H)

The help menu provides information about the software and the necessary information.

1. **Real-time Viewer:** Open the software help file.
2. **About:** Provides the information about the software like version and other related information.

5.2.3.3 Real-time Configuration Viewer-Tool Bar

The real time configuration has the following tools on the tool bar.

- ✓ 🖫 Save
- ✓ 🖫 Backup the configuration
- ✓ ❌ Delete the project
- ✓ 📖 Option
- ✓ 🖨 Print

- ✓ Bank
- ✓ Channel Configuration
- ✓ Display Page Configuration
- ✓ Tools
- ✓ Comment
- ✓ Setup Controller (only for Controllers)
- ✓ Setup all Display pages in Digital Mode Overview display.
- ✓ Fast Backward
- ✓ Backward
- ✓ Forward
- ✓ Fast Forward
- ✓ Project Auto configure
- ✓ Close and return to main program.

5.2.3.3.1 Option

The Options menu of real-time configuration have the following options.

1. Share
2. Email
3. Communication
4. Format
5. Display
6. Print auto-output
7. User Manage
8. The display of AI serial for IO Modules (only for IO Modules)
9. Auto start project

1. Share

The share menu will allow the user to configure for share or not to share the data with others.
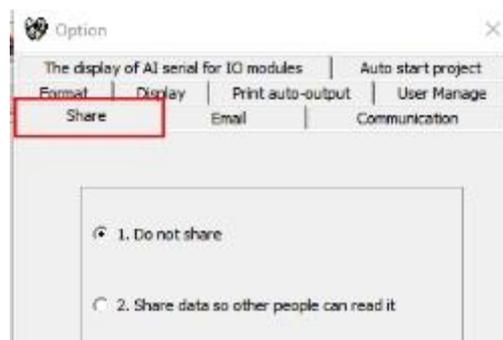
Share/do not share options are available for user selection. If the share option is selected, then historical data available on the computer can be shared from other computers. On selection of this share data, the shared folder will be created and the following message will be shown

For example, the recorder is connected to the PC with a real-time viewer and wish to analyze historical data at a different computer. While opening the project in the second Computer, directly link to the project file available under **C:\Data Acquisition Studio** through network configuration. This will minimize the data transfer between Modbus slaves and the computers and make it more efficient by using available resources through the network Configurations.

2. **Email**

The Email menu will allow the user to configure the email server to send an email on an event or alarm. The default Port number 25 is used to send email from the SMTP server. If the network administrator configured a different port in LAN for accessing internet/email, then the user has to modify the port number accordingly.
To send an email for any event, the procedure is as follows.

❖ Set SMTP server details as below. Please contact system or network administrator for the server details if the computer is connected in LAN.
❖ Host, Port, User name,
❖ From: Sender email address
❖ To: Receiver email address (Max.10 email addresses can be selected)
❖ In case, email is successful, it delivers as follows

Type: HI Alarm
Source: Tag1
Active Time: 05/08/09, 13:31:04
Value: 50
Comment: Level high

❖ If Email is failed to deliver, then it prompts the following error message. In this case, it   requires to check all the email settings
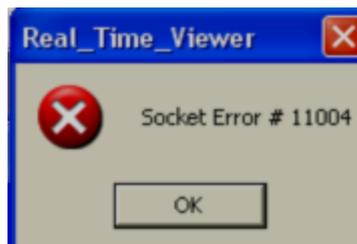
3. Communication

The communication menu will allow the user to configure the communication parameters for the project.

Sampling rate: It is used to set data display time for Real-Time Viewer. User can select
One from the following for real-time monitoring.
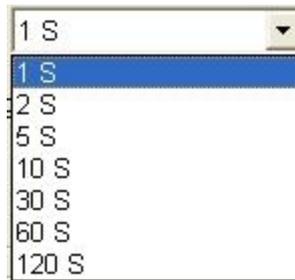
Time out: This is time set for generating time out errors related to real-time viewer Communication.

For example, if IO module and PC with data acquisition software are located at different places connected through Ethernet across different gateways, and then the user can adjust sampling rate and time out settings to avoid errors in communication. When the real-time viewer is running, please observe the following taskbar at the bottom side of the screen.

Here, scan time should always be less than the sampling rate. Otherwise, communication errors will occur. If PC and Modbus slave devices are connected by a long-distance network, then there might be chances that scan time gets increased. So, check this and set sampling-rate more than scan time. Also, the user can set time out settings to generate Communication failure errors. Maximum time out settings possible is 60 sec. For example, scan time is adjusted and time out setting = 30 sec. This means, if scan time is more than the sampling rate for more than 30 sec, then communication errors will be generated.

4. **Format**

The Format menu will allow the user to configure the date-time format and set the name for the software on the PC.
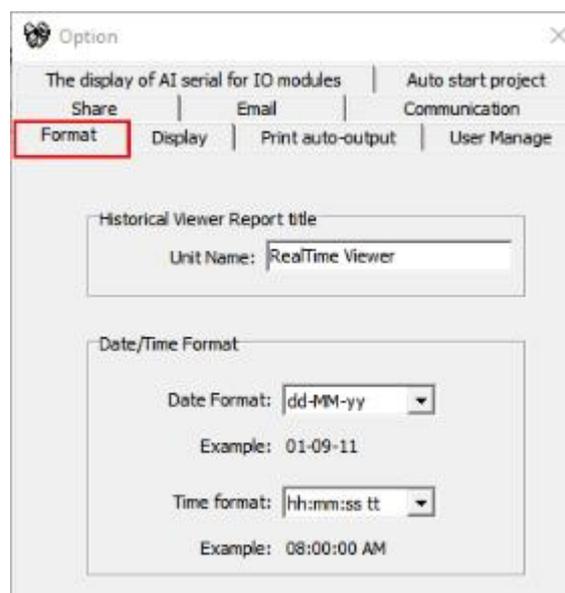
5. Display

The Display menu will allow the user to configure the display properties for communication error, latest event/alarm list, auto page scrolling and screen display for alarm action.

Auto-page:
The Auto page function is to rotate pages at a set time interval. If this option is enabled and time is set, then, display pages in Real-Time Viewer will be rotated cyclically as per the set time
Action: Enable, Disable options are available
Interval: This is the time interval and max. 60 sec. is possible

6. Print Auto-output

The Print auto-output menu will allow the user to configure to do the automatic printing of historical data from the PC in the pre-defined interval.
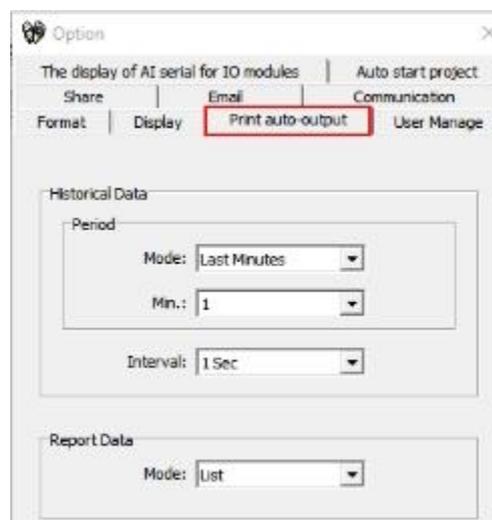
7. User Manage

The User Manage menu will allow the user to configure the user security for the project. The user can set the password and auto-logout time.

Disable: The security function will be disabled.
Set Password: Set password only for user security.
User Security Level: The user can set the password and auto-logout time for security.

8. The display of AI serial for IO modules

This is applicable only for the IO module. If the IO module is connected with the real-time viewer, then this option will allow the software to check the input status of the IO module and display according to the selection in this tab.
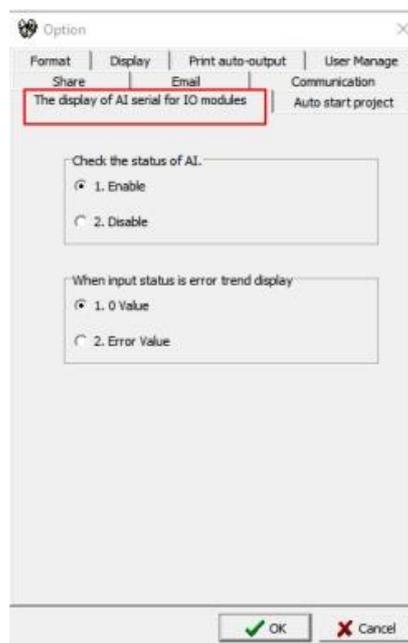
9. **Auto start project**

This tab will allow the user to configure the last project to be started when the software started.
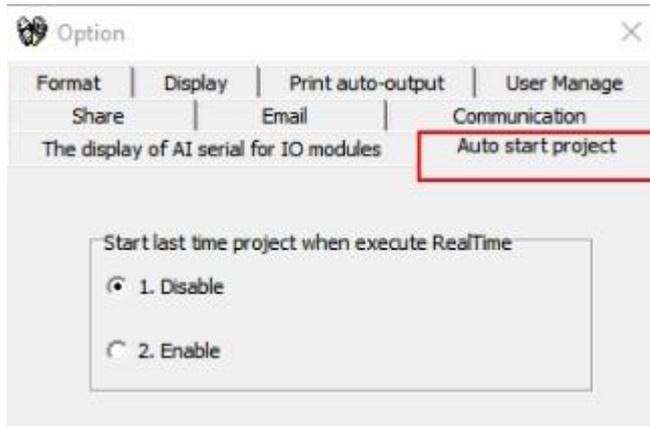
5.2.3.3.2 Bank Configuration

There are four banks are available in real-time viewer configuration to configure for the devices to connect with the software. All four banks will utilize different communication ports for communication. Ethernet and serial communication ports can be used for communication.

1. **Ethernet Bank Configuration**

The Ethernet port can be configured with port no as 502 and protocol as Modbus_TCP
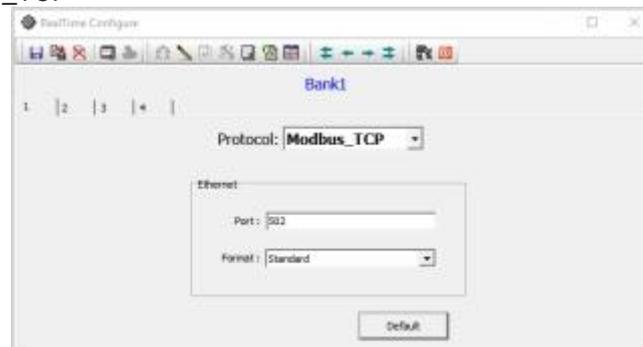
1. **RS232/RS485 Bank Configuration**

The serial RS232 or RS485 ports can be configured with Protocol as Modbus_RS232 and other communication parameters such as com port no, Baud Rate, Parity, Data Bits and Stop Bits as per the connection.

Note: It is possible to connect more than one device with the software with a different mode of connection. For example, one device can be connected via Ethernet and another device can be connected via RS485 or RS232.

5.2.3.3.3 Channel Configuration

The channels are auto-configured with all the configured tags from the device by the software. The configured tags channels can be viewed by selecting the channel configuration icon ✎ in the real-time configuration. It will display the configured device and channel information.

The channel configuration can be modified or deleted by selecting Modify or Delete options. There are additional channels can be added by selecting Add option in the software. The available channels are as below.

1. Recorder Channels from Recorder
2. Controller Channels from Controller
3. IO Module Channel from IO Modules
4. Math channels for a math operation

Device Type: Math Operation   Bank: 1   Tag Name: Tag2

Protocol: Modbus_TCP   ☑ Use Converter Device Node address 1   IP address:

Log

Trigger: by Time   LogSpeed: 1 Sec/Det   LogMethod: Instant

Data Byte Type: 4 Byte   Value Low: -1.4E38   Value High: 1.4E38

Unit: Decimal: 1

Expression: 0.0

Scale

Scale Transformation: Enable   Scale Low: -1200.0   Scale High: 2400.0

Event/Alarm

	Type	SetPoint	Log	Job1	Job2	Hysteresis	Holding Time
1	NO	0.0	No Action	No Action	No Action	0.0	Disable
2	NO	0.0	No Action	No Action	No Action	0.0	Disable
3	NO	0.0	No Action	No Action	No Action	0.0	Disable
4	NO	0.0	No Action	No Action	No Action	0.0	Disable
5	NO	0.0	No Action	No Action	No Action	0.0	Disable

✔ OK   ✗ Cancel

5. Linear Channels for 3rd party Modbus slave devices to connect via Modbus protocol.

Device Type: Linear   Bank: 1   Tag Name: Tag3

Protocol: Modbus_TCP   ☑ Use Converter Device Node address 1   IP address:

Log

Trigger: by Time   LogSpeed: 1 Sec/Det   LogMethod: Instant

Data Byte Type: 4 Byte   Value Low: -1.4E38   Value High: 1.4E38

Gain: 1.0   Offset: 0.0   Decimal: 1

Device

Register Type: Input Register (3xxxx)   Data Type: UINT16   Starting Address: 0

Unit: Inverse: Disable

Conversions

Type: Enable   Engineering Low: -1999.9   Engineering High: 4553.6

RAW Low: 0   RAW High: 65535

Event/Alarm

	Type	SetPoint	Log	Job1	Job2	Hysteresis	Holding Time
1	NO	0.0		No Action	No Action	0.0	
2	NO	0.0		No Action	No Action	0.0	
3	NO	0.0		No Action	No Action	0.0	
4	NO	0.0		No Action	No Action	0.0	
5	NO	0.0		No Action	No Action	0.0	

✔ OK   ✗ Cancel

6. Simulate Channels to simulate the input signals by the software

All the channel configurations are similar to recorder channel configuration. Every channel can be configured with 5 different types of events or alarms similar to the recorder and each event can be configured with two jobs.

Device Type: Display channel source

Bank: Display current Bank number

Tag Name: It is to define the name for each channel in a maximum of 9 characters

Auto-Update: If you wish to modify Tag name and modify the configuration, deselect it

Use Gateway-Device Node address: It is the address of selected device type

IP address: Display current gateway IP address

Log Type: Enable/Disable. Select disable while a specific channel is not required at this time. Select enable while a specific channel is required

Log Speed: It is the logging speed (recording speed) of measured data. Select Log Speed column, then choose 1, 2, 5, 10, 15, 20, 30 seconds, 1,2,5,10,15 Minutes, 1 Hour, 2 Hour.

Log Method: The method of logging measured data. Select the column, and then choose the Log method of Instant, Average, Minimum or Maximum data

Instant: logging in the last measured data at the sampling interval

Average: logging in averaged measured data at the sampling interval

Minimum: logging in minimum measured data at the sampling interval

Maximum: logging in maximum measured data at the sampling interval

Trigger: Select various types like "by time" or "by change" or disable

By Time: Data log based on Log Speed and Log Method

By Change: Depends on Tolerance setting. Log speed and Log Method is disabled if this option is selected and if this option is selected sampling rate is fixed at 1 sec. This option is selected to save memory in PC If data logging is required in set log speed (fixed time interval), select Trigger as by timer. If data logging is required only when there is a change in process value, then select Trigger as by change. This will save memory

Tolerance: This is enabled if "by change" is selected at Trigger Type. For example, if tolerance is set at 0.5, then if the new process value is more than or less than 0.5, then only the new sample will be logged

Data Byte Type: Choose 2 or 4 or 8 byte

Range Low: Range low for the specific channel in the selected device, ex: 4.00 mA

Range High: Range high for the specific channel in the selected device, Ex: 20.00 mA

Decimal: select one of the options - 0, 1, 2, 3 or 4

Gain: It is a multiplier to correct the sensor error. The correct value = (the process value + offset) x gain

Offset: It is offset value to correct the sensor error

Unit: The engineering unit of input

Sensor: It displays input type automatically as per the type of IO card selected

Scale Low: Defines the low scale with decimal if necessary. For instance, input 0-10 V, the Scale Low can be set up with value 0.00 to be correspondent to low range 0 V.

Scale High: Defines the high scale with decimal if necessary. For instance, input 0-10 V, the Scale High can be set up with value 100.00 to be correspondent to high range 10 V.

5.2.3.3.4 Event

The Event is frequently used for Alarm purpose. The event can also be used for digital output DO, Timer, Totalizer, Counter or Report.

Type: There are various types of H, L, HH, LL, R, r or Error to be selected for job or Alarm purpose.

H: High limit. When the process is over a high limit, the alarm or job is actuated.

L: Low limit. Any the process is lower than the low limit, the alarm or job is actuated

HH: High high limit, to set up another limit higher than the high limit for double warning.

LL: Low low limit, to set up another limit lower than the low limit for double warning.

R: Increasing the rate of change. The job or alarm is actuated when the rate of increasing process value is greater than the specified rate time interval. For example, when the Setpoint is set to 100_1S, if the process is increasing greater than the value 100 in 1 second, then job or alarm will be actuated.

r: Decreasing the rate of change. The job or alarm is actuated when the rate of decreasing process value is greater than the specified rate time interval. For example, when the Setpoint is set to 50_2S if the process is decreasing greater than the value 50 in 2 seconds, then job or alarm is actuated.

Dev+: It is deviation+ event. This event will be triggered by the positive deviation of the process value. The job or alarm is activated when the process value is deviated by the value higher than setpoint from the previous process value.

For example,
> Setpoint =10
> At 10.00.01 Hrs., Tag1=40
> At 10.00.02 Hrs., Tag1 = 51
> Then, job or alarm is activated

Dev-: It is deviation- event. This event will be triggered by the negative deviation of the process value. The job or alarm is activated when the process value is deviated by the value lower than setpoint from the previous process value.

For example,
> Setpoint =10
> At 10.00.01 Hrs., Tag1=40
> At 10.00.02 Hrs., Tag1 = 29
> Then, job or alarm is activated.

Error: If there is an error in channel input, then alarm or job is actuated

Setpoint: To set up the process value for actuating Job1 and /or Job2

Hysteresis: To avoid job has been activated too often, the option available to set for no reaction in 0.1% to 10% of full span (Low Scale to High Scale).

Job1, Job2: When an event occurs, the task to be performed is called the job. A typical example is to trigger sound buzzer in the event of high temperature. Each pen can accept five events (or alarms) and each event can create two jobs. Various types of jobs can be selected:

5.2.3.3.5 Jobs

The following jobs are available for configuration to be executed on an event

No Action: Do nothing

Log Alarm (Auto Ack): Record alarm with acknowledgement automatically

Log Alarm: Record alarms

Log Event: Record events

Send Email: Send an email if it is configured on an event

Sound Buzzer: Sound the buzzer on an event

DO Latch On: Set digital output/relay on, and then select Target let say DO 1. The relay is latched when it is activated. Digital Output relays will be shown if the digital output IO module is configured and available in the database

DO Latch Off: Set digital output/relay off, and then select Target say DO 1. The relay is latched when it is activated. Digital Output relays will be shown if the digital output IO module is configured and available in the database

DO Process: Set digital output/relay on for process high or low, and then select Target from DO 1 to DO 6. The relay is not going to be latched when it is activated. Digital Output relays will be shown if the digital output IO module is configured and available in the database

Enable Timer: Start the timer, and then select Target from Timer1 to Timer 100 or all Timers

Disable Timer: Stop the timer, and then select Target from Timer1 to Timer 100 or all Timers

Preset Totalz: Start the totalizer with a preset value, and then select Target from Totalz 1 to Totalz 50. It requires configuring totalizer via tools and enabling it to appear totalizer number in the jobs after selecting Preset Totalizer

Reset Totalz: Reset totalizer into zero, and then select Target from Totalz 1 to Totalz 50. It requires configuring totalizer and enabling it to appear totalizer number in the jobs after selecting Preset Totalizer

Enable Totalz: Start the totalizer, and then select Target from Totalz 1 to Totalz 50. It requires configuring totalizer and enabling it to appear totalizer number in the jobs after selecting Preset Totalizer

Disable Totalz: Stop the totalizer, and then select Target from Totalz 1 to Totalz 50. It requires configuring totalizer and enabling it to appear totalizer number in the jobs after selecting Preset Totalizer

Preset Counter: Start the Counter with a preset value, and then select Target from Cont1 to Cont50. It requires configuring Counter via tools to appear counter number after selection of Preset counter in the jobs

Reset Counter: Resets the counter into zero, and then select Target from Cont1 to Cont50.

Inc Counter: Increase the counter, and then select Target from Cont1 to Cont50

Dec Counter: Decrease the counter, and then select Target from Cont1 to Cont50

Log Report: Make the report for Counter and Totalizer

Reset MinMaxAve: In Report function, after logging the MinMaxAve data of AI and Math channels for one day for example, then reset historical data in order to log new data for the next day

Log Message: Log customized comments for alarm as messages on an event. A total of 100 messages available for customer customization

Print Historical Data: Prints the historical data as per print auto output configuration.

Print Event List: Prints the event list as per print auto output configuration.

Print Report List (Min/Max/Ave): Prints the report list as per print auto output configuration.

Print Snapshot: Prints the snapshot of the screen.

Output Historical Data: Output historical data to CSV format as per print auto-output configuration.

Log Report (Instant): Log the report with instant values.

5.2.3.3.6 Display Page Configuration

'   The display page configuration will allow the user to configure the display pages as per the requirement. The display pages will be auto-configured along with the auto channel configuration. The user can modify the channel and pages as per their requirement. There are 200 display pages available in Total with 24 pens/page.

Mode: This is for page enable or disable.

Page Marks: This is the name for the specific page. Ex: Section Kiln. Maximum 38 characters are allowed

Speed: This is the real-time trend display resolution. Select one of the options in 1 sec/dot, 2 sec/dot, 5 sec/dot, 10 sec/dot, 15 sec/dot, 20 sec/dot, 30 sec/dot, 1 min/dot, 2 min/dot, 5 min/dot, 10 min/dot, 15 min/dot, 1hour/dot, 2hour/dot,10 min/page, 30 min/page, 1 hr/page, 2 hrs/page, 4 hrs/page, 8 hrs/page, 12hour/page, day/page and week/page. If you wish to see both Real-time and historical combined, then, select say day/page at the display. Then, the Real-time trend in screen will be for the last 24 hours update dynamically

Direction: Selects the trend direction horizontal or vertical.

Background: Defines the background colour of Trend mode in black or white

Pen: Defines a specific channel as a drawing pen, its colour, width, Display Hi and Display Low.

Channel: Selects a specific analog input AI or Mathematics Math, or selects Disable if a specific channel is not required.

Color: Selects the colour for each pen.

Width: Selects the width of the trend, 1-thin, 2-medium, 3-wide.

Low: Defines the low scale for a pen on the display.

High: Defines the high scale for a pen on the display.

Forward / backward button: It is to navigate to next/earlier 8 sets of pens for display configuration
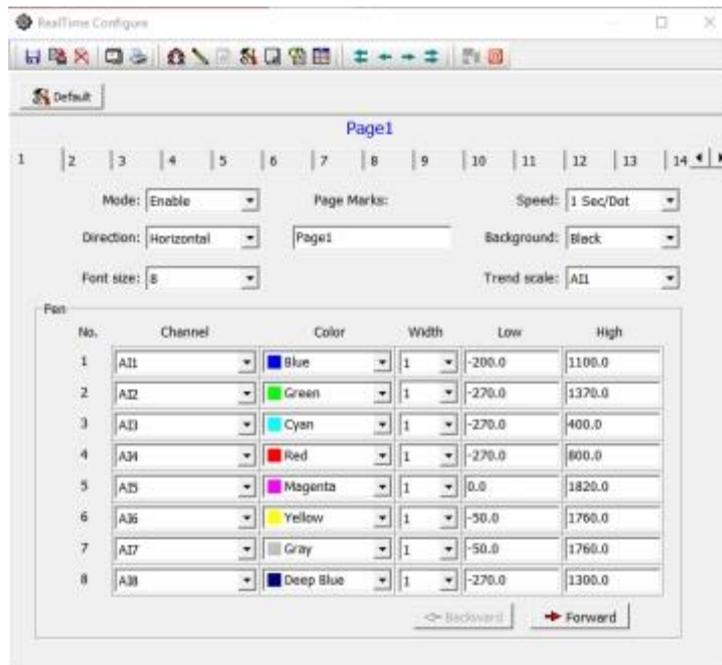
5.2.3.3.7 Tools Configuration

The real-time viewer has Timers, counters, Totalizers as tools for the user to use as per the application requirement.

1. **Timers**

Maximum 100 timers available for configuration

Type: Countdown, Repeat Countdown, Daily, Weekly or Monthly.
Countdown: Defines the interval of time, e.g., days, hours, minutes and seconds. (Not Real-Time clock)
Repeat Countdown: Repeats the previous countdown.
Daily, Weekly or Monthly: The timer works in the selected interval of Real-Time clock
Action: Disables or enables the timer.
Job1, Job2: various jobs as described in jobs for each timer.
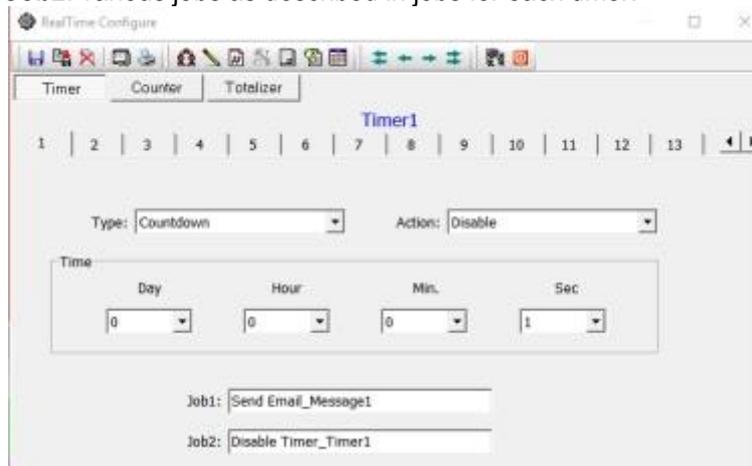
2. **Counters**

Maximum 50 counters are available.
Name: Defines the name of the counter.
Desc: Defines the description for a specific counter on the display.
Unit: Defines the unit of counter
Preset: Defines the preset value for the counter. The counter starts from a preset value.
Event: Defines the type, setpoint, Job1 or Job2.
Type: Select one of three options: None, Process Hi, Process Low
Setpoint: Defines the setpoint of process value to trigger the counter.
Job1, Job2: various jobs as described in jobs for each counter

3. **Totalizers**

Maximum 50 Totalizers are available.
Name: Defines the name of the totalizer.
Desc: Defines the description for a specific totalizer on the display.
Source: Select a specific analog input or Math input to be used for totalizing.
Action: Disables or enables the totalizer.
Decimal: Defines the decimal point for the totalizer.
Period: Selects second, minute or hour used for the totalizer.
Unit: Defines the unit of totalizing
Preset: Defines the preset value for the totalizer. The totalizer starts from a preset value.
Low Cut: If Source channel has below this setting, then the value is skipped from Totalizing
Event: Defines the type, setpoint, Job1 or Job2.
Type: Select one of three options: None, Process Hi, Process Low
Setpoint: Defines the setpoint of process value to trigger the totalizer.
Job1, Job2: various jobs as described in jobs for each totalizer.
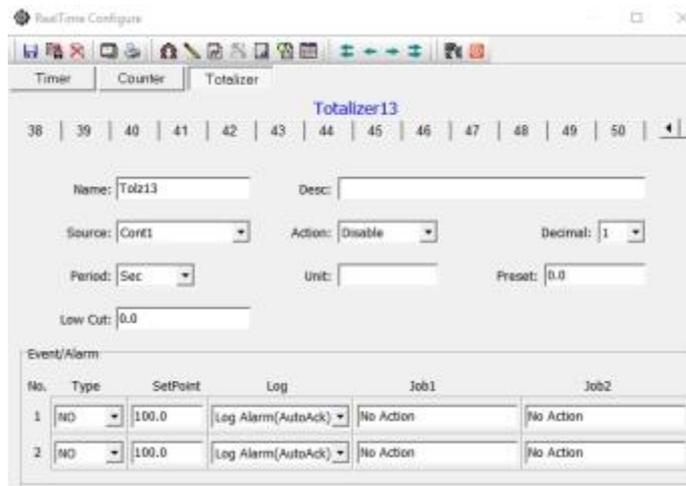
5.2.3.3.8 Comments

There are 100 comments are available to customize the alarm messages. The user can select one comment from this list when to log message or send Email jobs are configured. Each comment can accept a maximum of 50 characters.
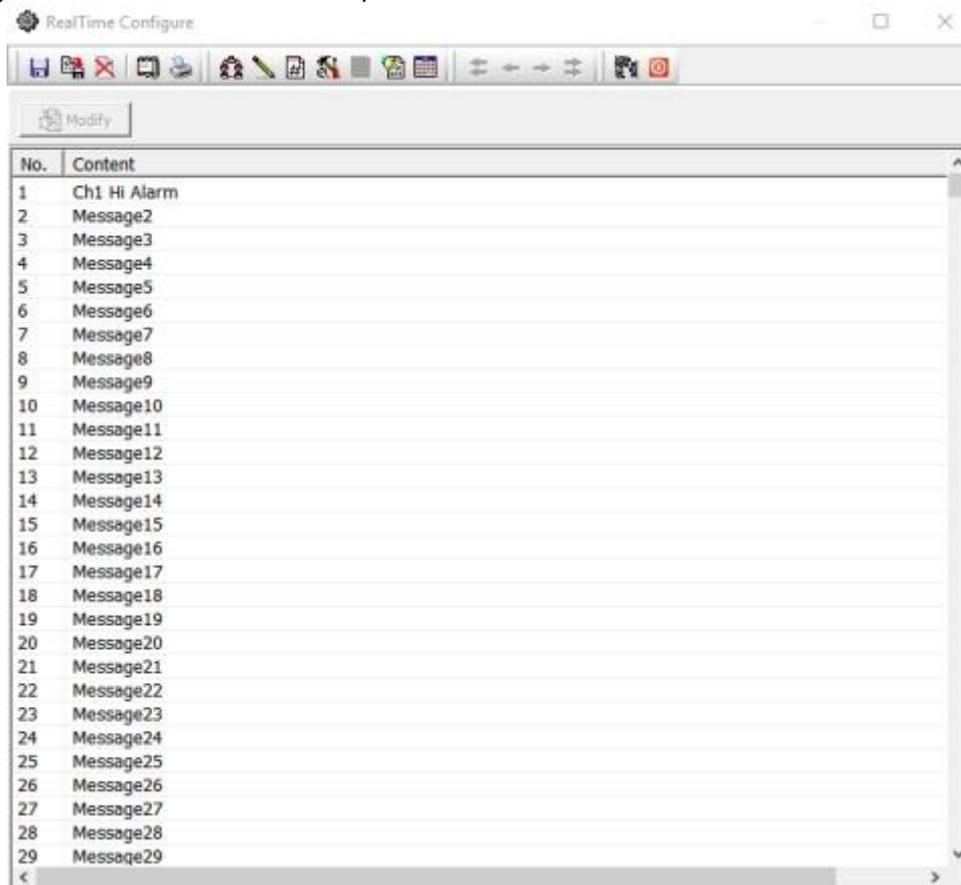
5.2.3.3.9 Auto Configuration

The Autoconfiguration will automatically configure the tags from the recorder, IO Module and controllers. This will simplify the project setup procedure.
Device type: Select IO Card for the addition of IO Module into the network
Bank: Select bank from 1 to 4 as per bank configuration

IP Address: IP address of the IO module. After Entering the IP address press '+' to add to the IP List.

IP List: IP List of the IO modules. If any recorder needs to be removed from the list, then select the IP address from the list, then press'- 'to remove the IP from the list.

Use Converter: Device Node Address: If the device is connected to PC via PC-E converter or IO module connected via Ethernet then select this option and enter the node address of the device.

From: Start address of the device in the RS485 network.

To: End address of the device in the RS485 network. This is not applicable for Recorders.

Click on "OK" to add all the devices into network configuration

5.2.3.4 Create a New Project

To create a new project, follow the below steps.

1. Click the icon or select New from File Menu.
2. Set a name for the project
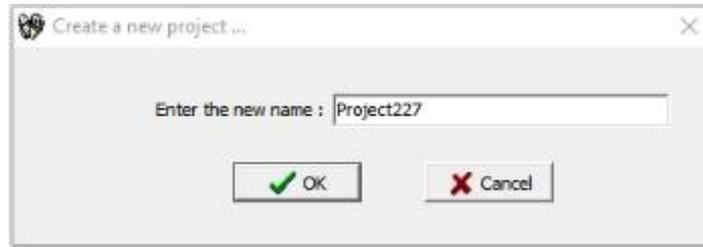
3. The Software requests the user for auto-configuration. Press No to configure the communication Banks.
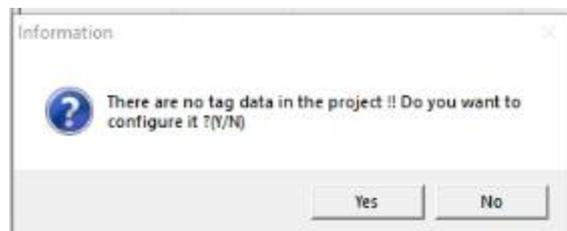
4. Click Bank icon to configure communication bank.
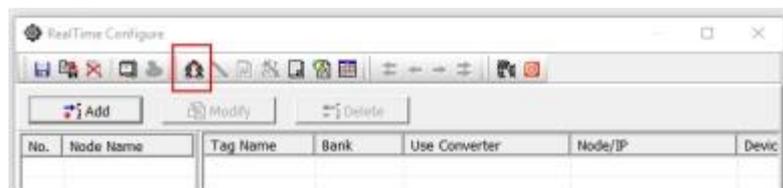
5. There are 4 different banks are available for the user to configure. It will allow the software to read the data from different communication networks like RS232, RS485, and Ethernet.
   5.1. If the device is connected to PC via Ethernet port, then configure the bank with Protocol as Modbus_TCP and port no as 502.
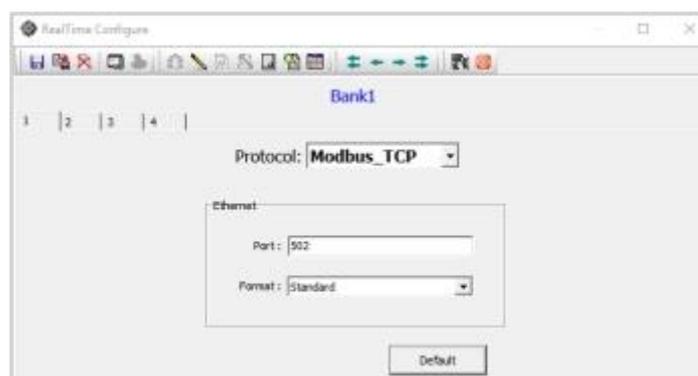
5.2. If the device is connected to PC via RS232 or RS485 port then configure the bank with Protocol as Modbus_RS232 and other communication parameters such as com port no, Baud Rate, Parity, Data Bits and Stop Bits as per the connection.
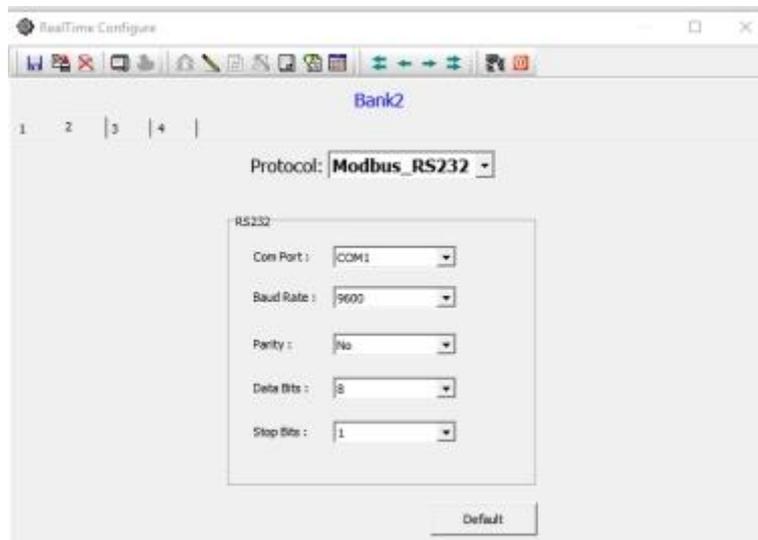
5.3. After configuring the banks close the configuration viewer and restart the program.

6. Click the icon or select New from File Menu.
7. Set a name for the project
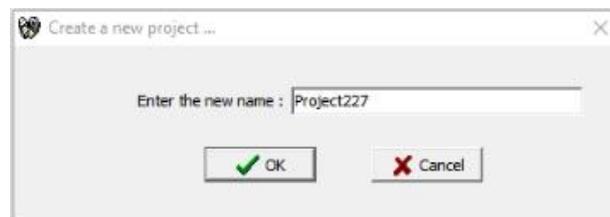
8. The Software requests the user for auto-configuration. Press yes to configure the tags of the device automatically by the software.

9. Add the device to the project as per the connection.
   - 9.1. Select IO Card as a device type to read the data from the IO Module.
   - 9.2. Select the Bank as per the connection
   - 9.3. Enter the IP address and press'+'key to add the device to the project. It there are any existing devices in the list and needs to be removed then select the IP address and press'- 'key to remove.

   - 9.4. Configure the log speed and log method
   - 9.5. Press OK to establish the communication and auto-update the tags from the IO Module.
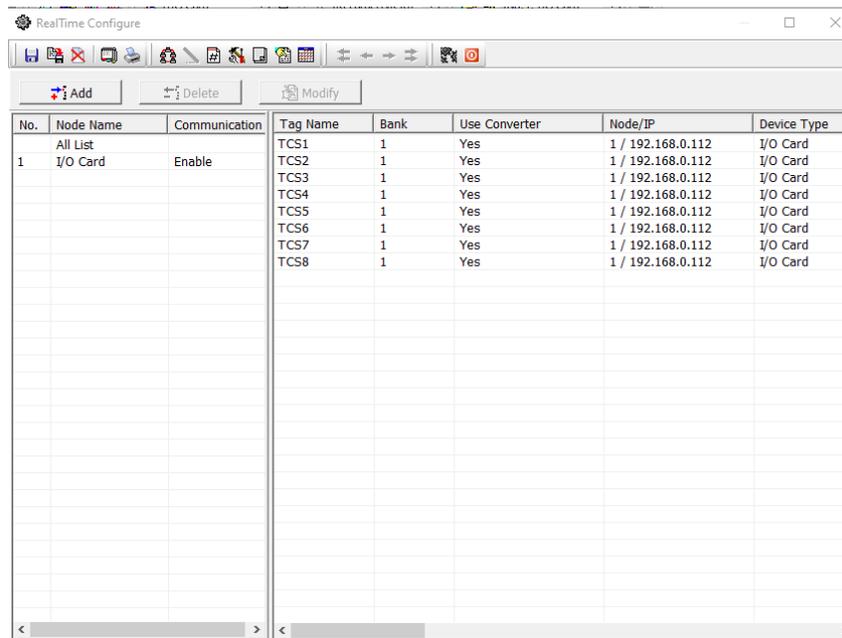
9.6. If there is more than one device is added to the project then the tag configuration of all the devices will be listed.

10. Close the Real-time configuration viewer to update the tag contents and logging the data from the configured devices to PC. The configuration Viewer can be closed by pressing the X key on the right side top or key.

11. Press yes to apply the new settings to the project.
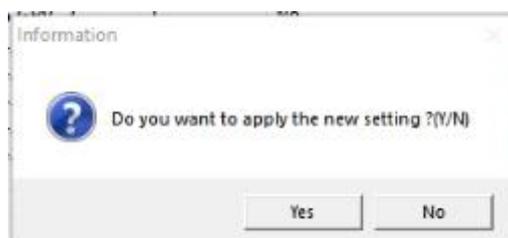
12. If the USB License key is not plugged to the USB port of the PC, then the Software will show the warning message and start the demo mode. The software will stop working after the demo period.

Information ✕

ℹ Can not find the "Hardware Lock at USB port", So the 'Data Acquisition Studio' will auto close for this trial version after one hour later !!

OK
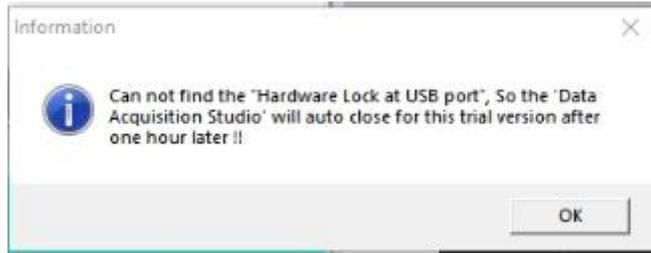
13. Press OK to start in demo mode.
14. If the USB License key is plugged into the USB Port of the PC, then the software will start reading the data from the devices and log the data to the PC.
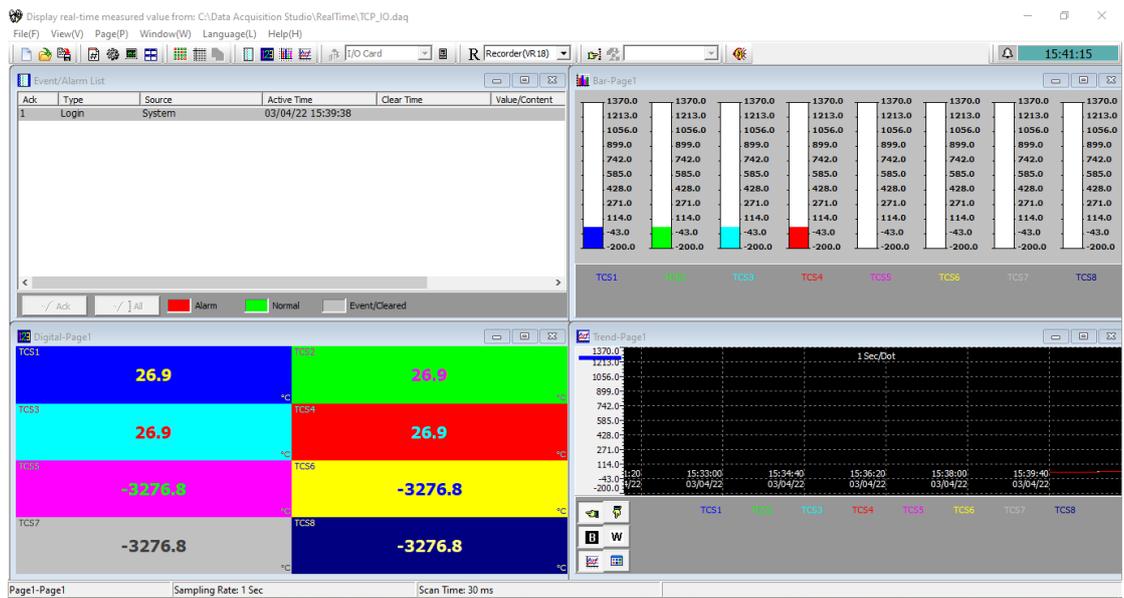
5.2.3.5 Open an Existing Project

To open an existing project the following procedures to be followed.

1. Click the icon 🗁 or select Open from File Menu.
2. The software will list the projects from the default project path for the user to select.
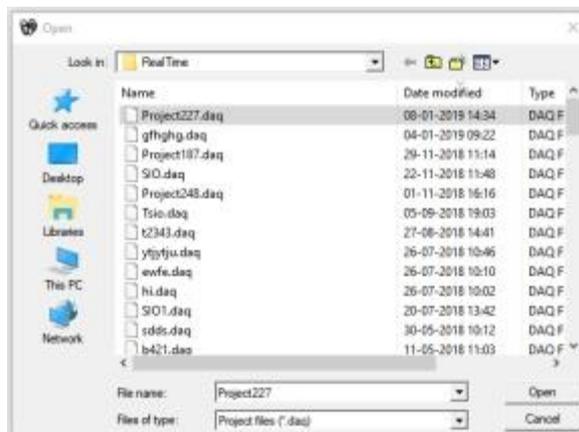
3. Select the project and click Open to open the project.
4. If the USB License key is not plugged to the USB port of the PC, then the Software will show the warning message and start the demo mode. The software will stop working after the demo period.

5. Press OK to start in demo mode.
6. If the USB License key is plugged into the USB Port of the PC, then the software will start reading the data from the devices and log the data to the PC.
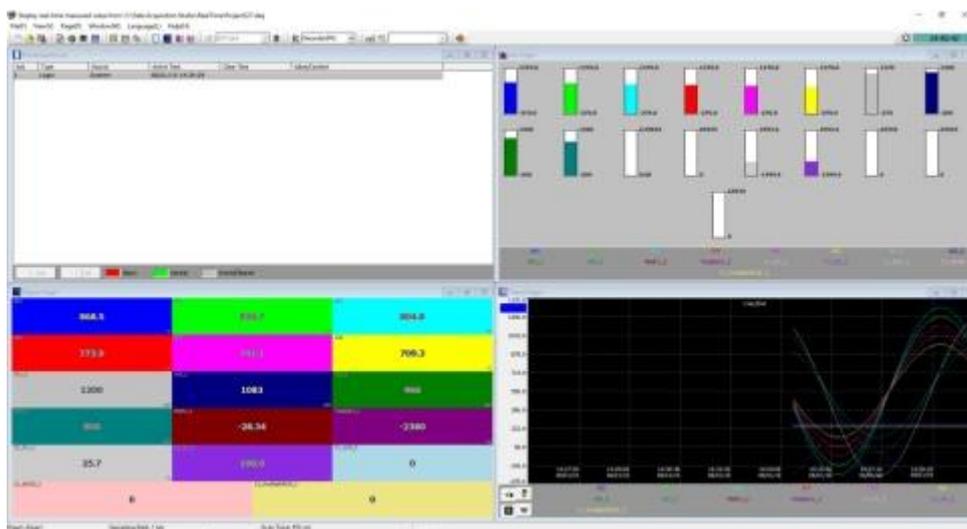
5.2.3.6 Add a Device to the Existing Device

It is possible to add a device to the existing project and log the data. For adding the device to the existing project follow the procedure as follows.

1. Open the project by using the Open project option as explained above.

2. Go to Configuration by using Configuration data in the View menu or icon on the Toolbar.
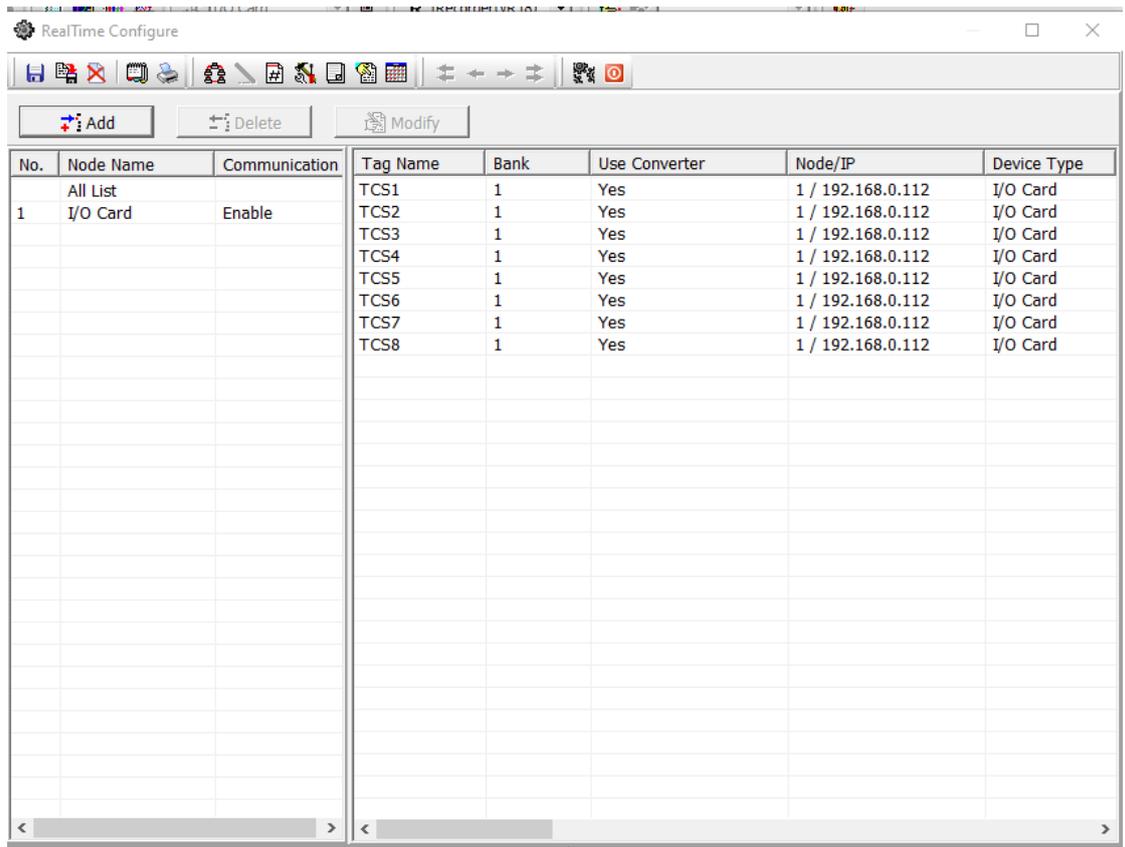
3. Click Add and configure the device information to add an additional device to the project.
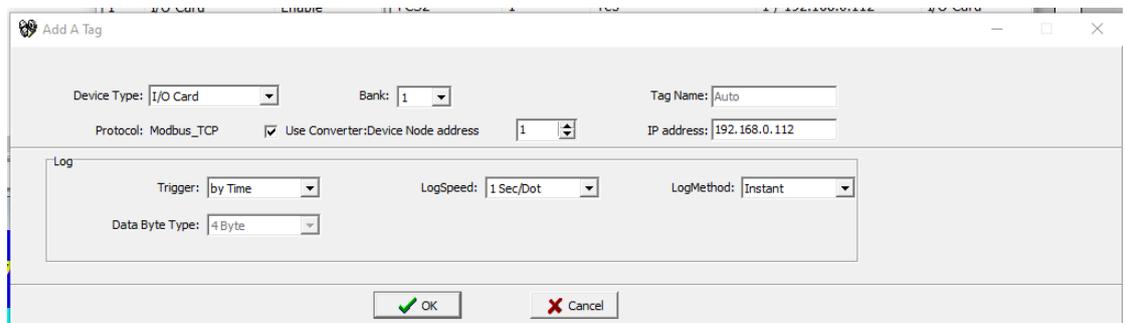
4. Now the real-time configuration will update the tags with new device information.
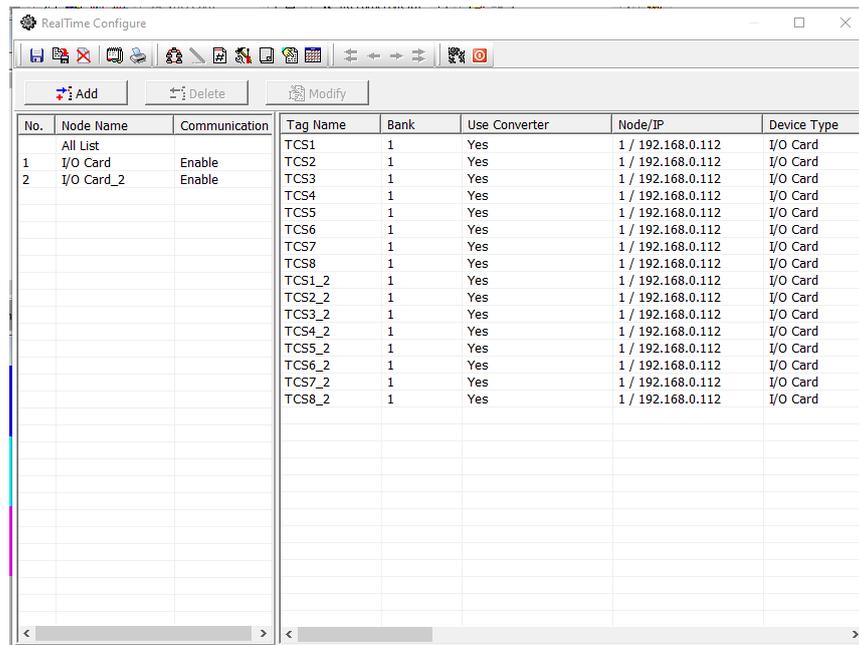
5. Close the Real-time Configuration Viewer to update the project with the new device.
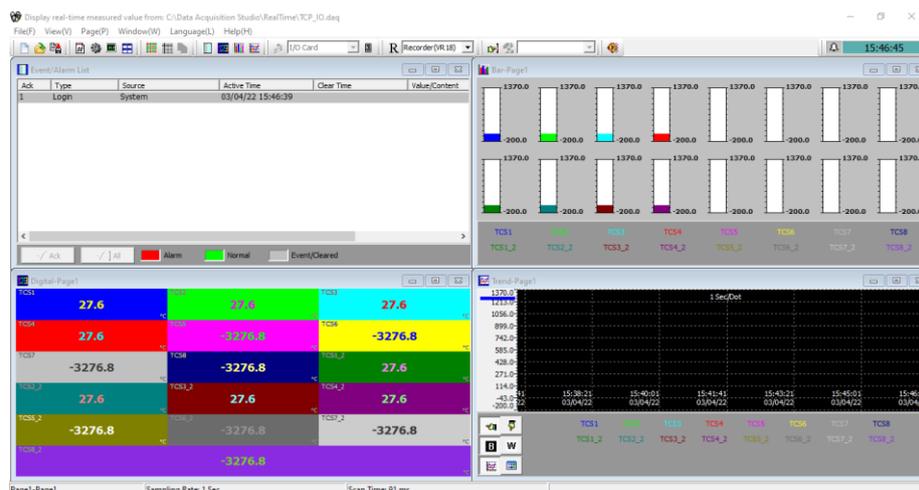
5.2.4 Dynamic Data Exchange (DDE)

Dynamic Data Exchange (DDE) is a standard inter-application communication protocol built into Microsoft Windows operating systems and supported by many applications that run under Windows. DDE takes data from one application and gives it to another application. It allows Windows programs that support DDE to exchange data between themselves.

Data from DAQ software can be exchanged with Excel on the DDE link. After completion of all network configuration (adding of all Modbus slaves), then open Data acquisition studio software – Real-time viewer. Open the existing project or create a project then go to File Menu in Real-time Viewer then select Create DDE Link in Excel.
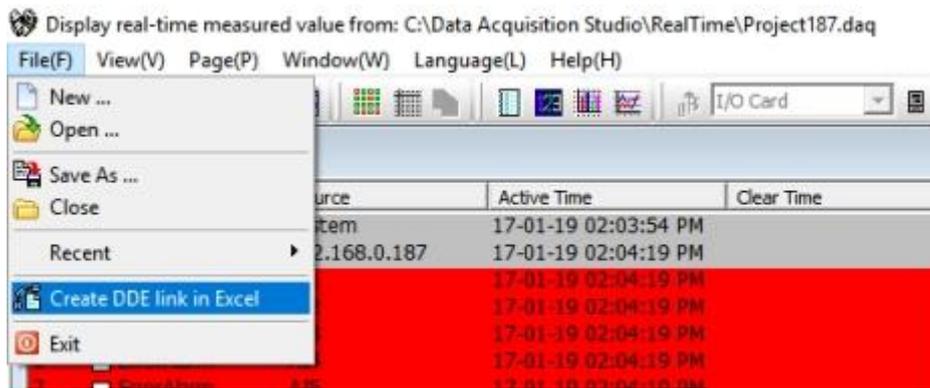
Specify the path and file name as follows. By default, the file name will start with DDE and the project name with underscore. Save the file name in PC at the selected path as above to proceed further.
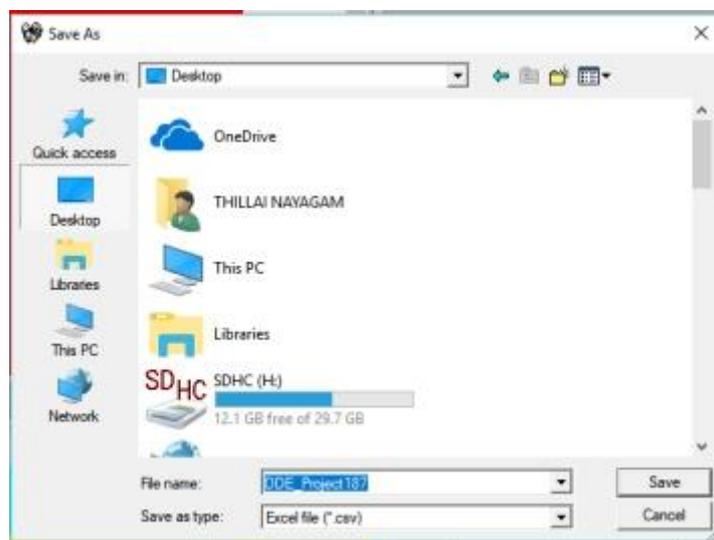
For example, if Desktop is selected in the path, then excel file should be available in Desktop. If the MS Office is not installed on the PC, then you cannot open the excel file created in the above procedure. Please contact your system administrator to install MS office software in the PC. Now try to open the file from Desktop created for using DDE application with the recorder through Real-time viewer Software.
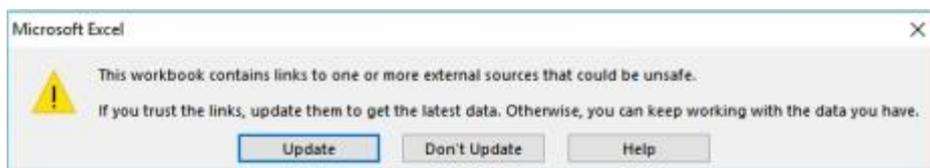
Click on update to activate DDE between DAQ software and Excel application. If the DDE is successful, then real-time data of the channels should be updated in the excel file as shown in the sample screen.

DDE expression format to get real-time data from the Real-time Viewer software is as follows.

=RealTime_Viewer|TagService!_TagN
Where N = 1,2,3…..
Application = RealTime_Viewer
Topic = Tag Service
Tag name = _Tag1 (Please observe underscore before the tag number)
It is possible to exchange data related to AI, DI, DO, Counters and Totalizers between
DAQ software and third-party applications running under Windows operating systems via DDE.

5.2.4.1 Procedure to find the tag number for the tag name to use in DDE applications

❖ Create a DDE link from Real-time viewer.
❖ Open Excel file. Three columns appear in the excel file as Name, Unit and Value as shown in the Excel file.

> **Name:** This is tag name actually defined in the channel configuration
> **Unit:** This is unit for the tag name defined in the channel configuration
> **Value:** This is the specific cell where the process value for the tag will appear in real-time.

❖ To find the DDE format for any tag in channel configuration, for a specific tag, double click at "Value" column for the corresponding tag defined at Name. For example, For Name= AI1 is at R2C1, double click at cell R2C3 to see DDE format for AI1. Click on Esc button at the keyboard to see process value at the cell from displaying DDE format.

❖ If any "Error" appears in any cell at excel, possible reasons are no data available at the selected tag. Check the channel configuration and make sure value is available
❖ If any "NAME" text appears in the excel file, it indicates that particular tag is not configured properly. Tag name may not available at DAQ software.

Note:
  If Excel file is not opening from the selected path, then check the following

✓ RAM size in the PC is very less. Restart the computer and then create the DDE link once again and open the Excel file.
✓ Increase virtual memory in the PC. Please contact the system administrator to check the virtual memory settings at the PC.

  My computer-properties-advanced-performance settings –advanced virtual memory.

5.2.4.2 DDE with 3rd party applications

  Once the data is available at Excel at a particular cell, then data can be exchanged with the 3rd party applications like PLC, SCADA, and Visual Basic etc. If data is to be exchanged with PLC, then PLC programmer can write Visual basic macro in Excel from the following link
  Excel – Tools – macro
  For the source code examples, PLC programmer may check the PLC manuals for DDE sample macros. It is also possible to exchange data from recorder to SCADA applications through DDE.

5.2.5 Historical Viewer
  The Historical data of the project can be viewed and analyzed by using the Historical Viewer software. The Historical data can be accessed by using the Measured Data option on the view menu on the real time Viewer.
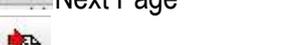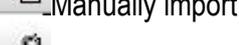
Once you select the measured data, the historical data of the project can be viewed and analyzed. Disabled items on the historical viewer tool bar are not supported for real time viewer project analysis.
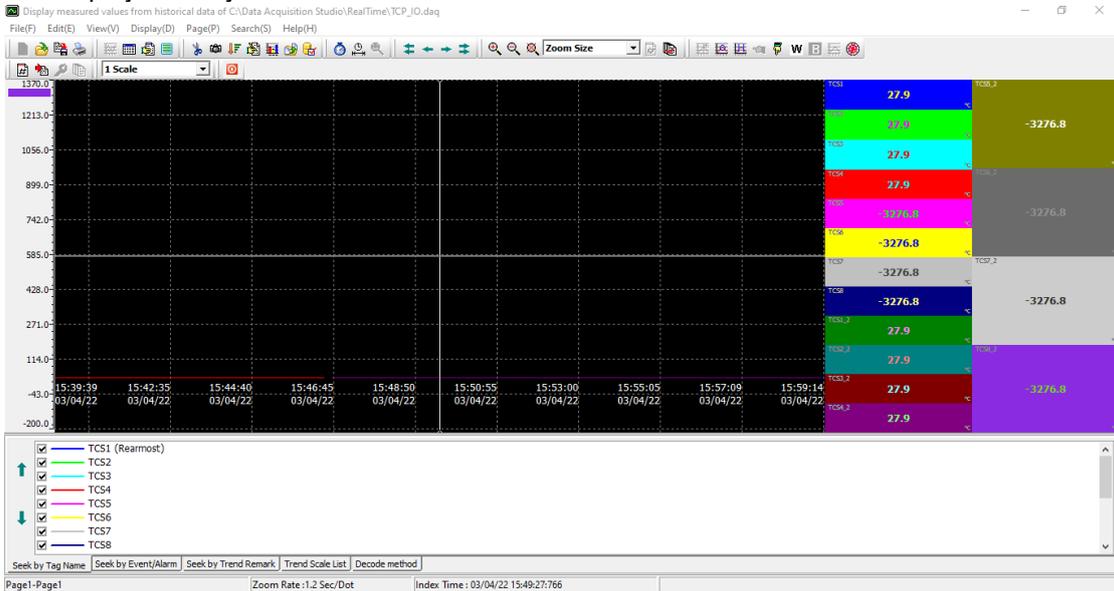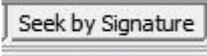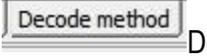

5.2.5.1 Historical Viewer-Tool Bar

The historical viewer has below tools on the tool bar.

- ✓ New
- ✓ Open
- ✓ Save As
- ✓ Print
- ✓ Trend View
- ✓ Event / Alarm List
- ✓ Report List
- ✓ Value List
- ✓ Manually Export data to Excel
- ✓ Copy Curves to Clipboard
- ✓ Remark
- ✓ Latest Event / Alarm List
- ✓ Manually Export data to Database Format (*.CSV)

- ✓ 📷 Snapshot
- ✓ 📊 Show Statistics
- ✓ 📄 Manually Export data in PDF
- ✓ ⏱ Search by Specific Time
- ✓ ⏱ Search by Specific Period
- ✓ 🔍 Search by Handwrite
- ✓ ⇄ Fast Backward
- ✓ ← Backward
- ✓ → Forward
- ✓ ⇄ Fast Forward
- ✓ 🔍 Zoom In
- ✓ 🔍 Zoom Out
- ✓ 🔍 Zoom All
- ✓ [Zoom Size ▼] Zoom Size
- ✓ 📊 Zoom By Time
- ✓ Zoom By Time and Value
- ✓ 📊 Select Period (Period A to B)
- ✓ 👈 By Horizontally
- ✓ 👆 By Vertically
- ✓ W White Background
- ✓ B Black Background
- ✓ 📈 Show Trend View
- ✓ ⊙ Show Circular View
- ✓ 📄 Next Page
- ✓ 📄 Manually import measured data
- ✓ 🔧 Configuration
- ✓ 📑 Page Configuration
- ✓ [1 Scale ▼] Scale Selection
- ✓ [Batch1-1 ▼] Batch Selection
- ✓ 👤 Signature List

- ✓ Logout
- ✓ Seek by Tag Name
- ✓ Seek by Event / Alarm
- ✓ Seek by Trend Remark
- ✓ Seek by signature
- ✓ Trend Scale List
- ✓ Batch Comments
- ✓ Decode Method
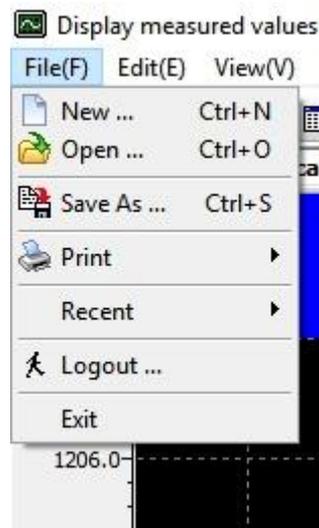
5.2.5.2 Historical Viewer-Menu Bar

The menu bar consists of 8 menus. They are listed as below.

1. File(F)
2. Edit(E)
3. View(V)
4. Display(D)
5. Page(P)
6. Search(S)
7. Language(L)
8. Help(H)
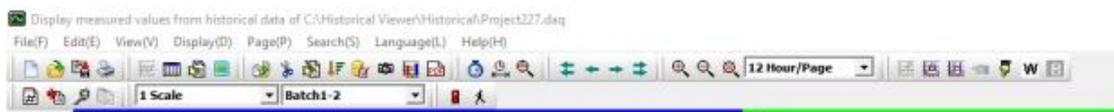
5.2.5.2.1 File (F)

Below are the submenu options available in File Menu.

1. **New:**   Create a new project.
2. **Open:**   Open an existing project.
3. **Save As:** Save the project with a new name.
4. **Print:**   Print the data.
5. **Recent:** Open recently opened projects.
6. **Logout:** Log out the current user.
7. **Exit:** Exit the program.

5.2.5.2.2 Edit (E)

Below are the submenu options available in Edit Menu.
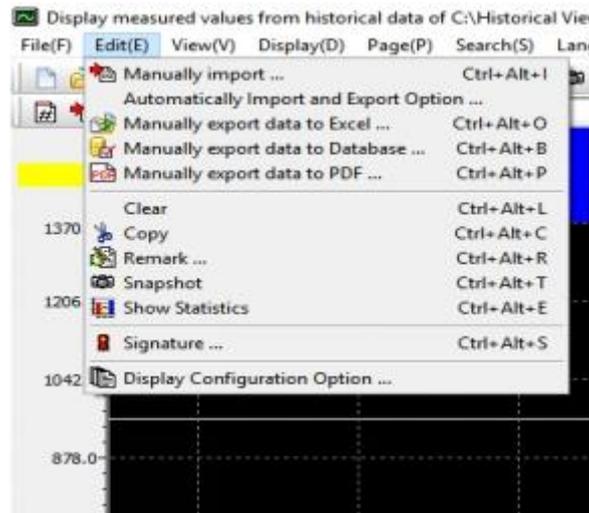
1. **Manually Import:** Manually import the data from the device.
2. **Automatically Import and Export Option:** Automatically import the data from the device and exported to Excel, PDF or Database format
3. **Manually export data to Excel:** Manually export the data to excel
4. **Manually export data to Database Format:** Manually export the data to the database format .csv
5. **Manually export data to PDF:** Manually export the data to PDF
6. **Clear:** Clear the data from the project for a specific time period or all.
7. **Copy:** Copy the screen
8. **Remark:** Add remark to the data
9. **Snapshot:** Print the snapshot of the trend view.
10. **Show Statistics:** Show the statistical data Min, Max, Ave, P-P, Mean, RMS, Point A, Point B, difference of point A and point B (A-B) of the displayed trend.

11. **Signature:** Shows the list of signatures on the data.

12. **Display Configuration Option:** Select the display configuration as automatically or manually.
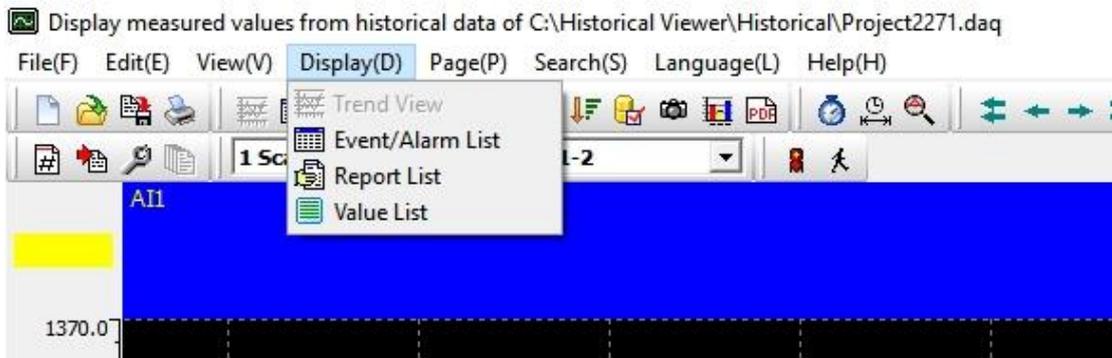
5.2.5.2.3 View (V)

Below are the submenu options available in the View menu.
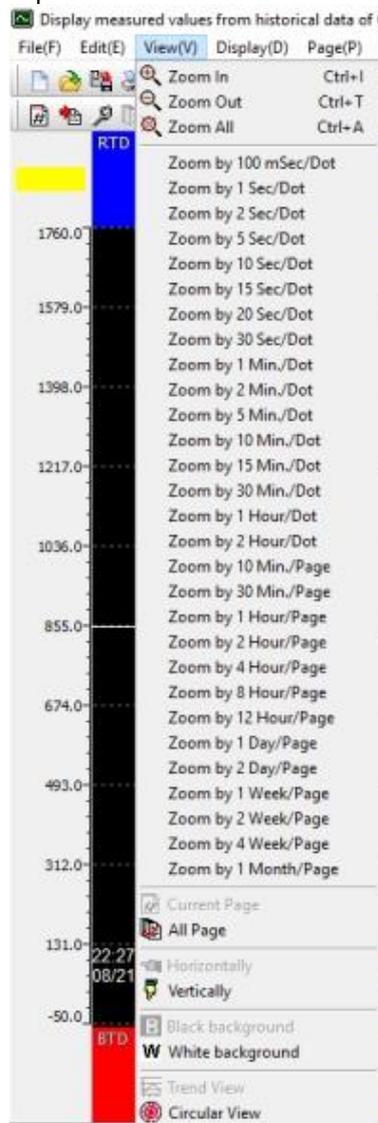
This will allow the user to select the different zoom rate for the data, vertical or horizontal direction of the trend and black or white background.
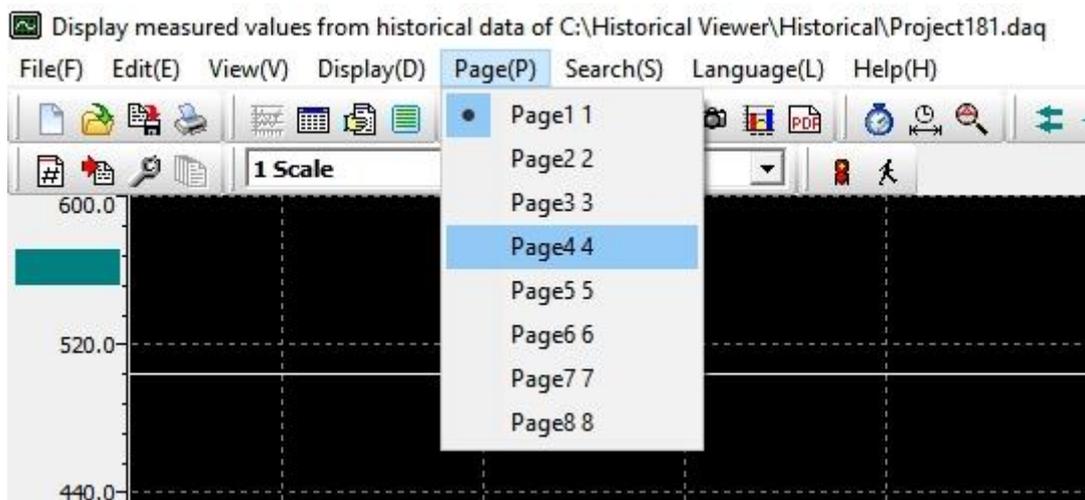
5.2.5.2.4 Display (D)

The below are the submenu options available in Display Menu.

1. **Trend View:** View the data in trend view mode.
2. **Event/Alarm List:** View the Event and alarm List of the data.
3. **Report List:** View the report list of the data.
4. **Value List:** View the data in Value List mode.
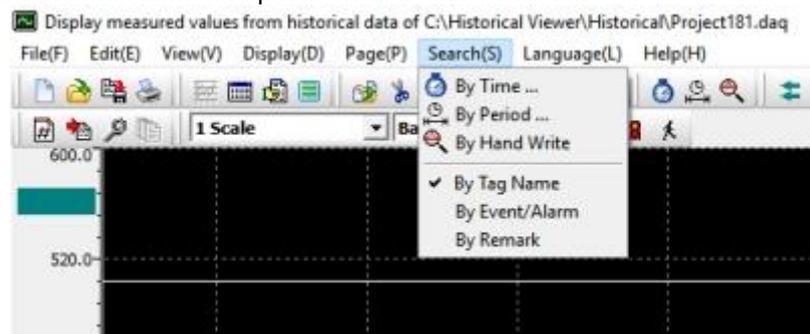
5.2.5.2.5 Page (P)

The below are the submenu options available in Page Menu.

The user can select the display page to be viewed from the shown list.

5.2.5.2.6 Search (S)

Below are the submenu options available in Search Menu.

1. **By Time:** Search the data at a particular time.
2. **By Period:** Search between two periods. Hold the mouse left key and move to select the period A and Period B.
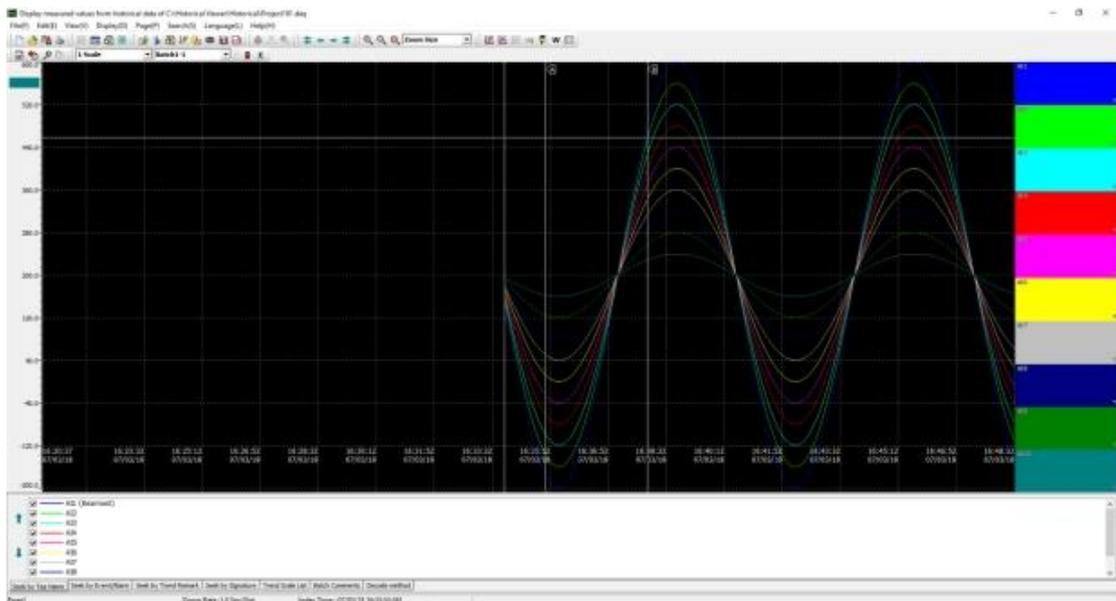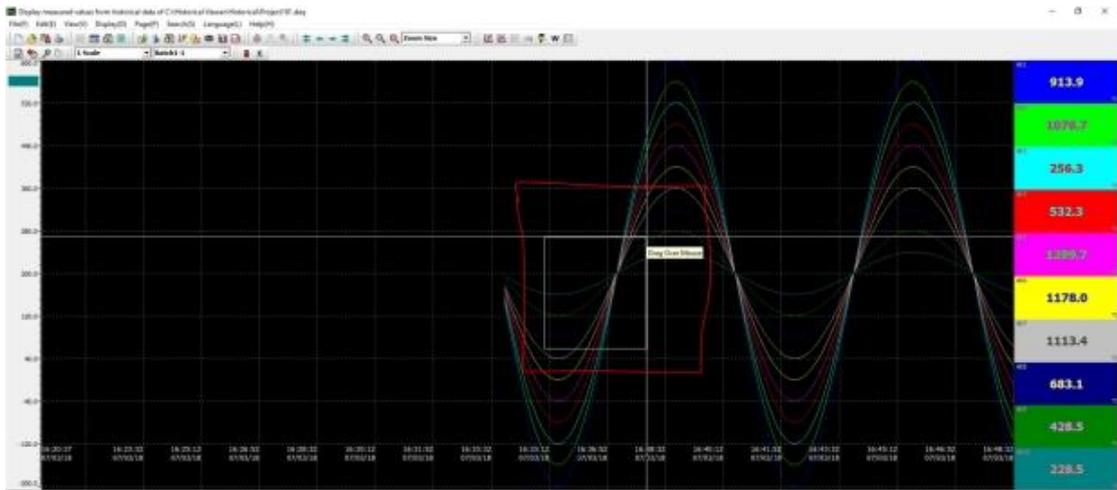
3. **By Handwrite:** Search the data by handwriting.
4. **By Tag Name:** Search the data by tag name.
5. **By Event/Alarm:** Search the data by Event or Alarm.
6. **By Remark:** Search the data by the remark.

5.2.5.2.7 Language (L)

The display language of the software can be changed by selecting any one of the available languages from the sub-menu.
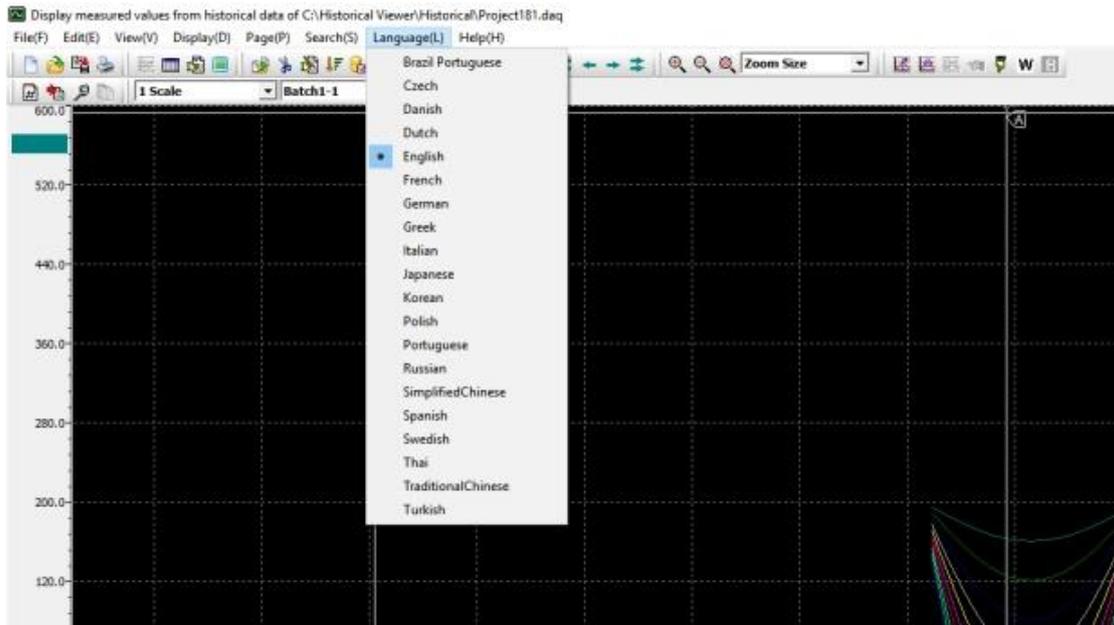
5.2.5.2.8 Help (H)

The help menu provides information about the software and the necessary information.

1. **Historical Viewer:** Open the software help file.
2. **About:** Provides the information about the software like version and other related information.

6 Specifications

6.1 Environmental

Operating Temperature	-10°C to +50°C
Storage Temperature	-40°C to +85°C
Humidity	Up to 95% non-condensing.

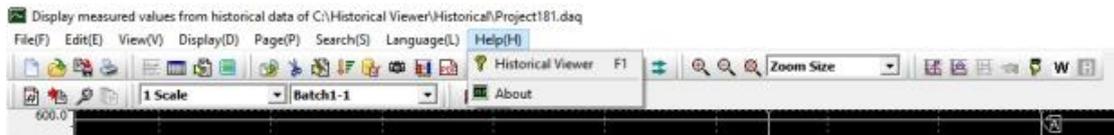## 6.2 EMC Installation Instructions

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

6.3 EMC Test Results

Modbus TCP EMC Test Results													
Test	**Standard**	**Test Value**	**Modbus TCP Product Compliance**										
Immunity Test Results EN 61326-1			**16DI**	**16DO**	**8DIO**	**4RO**	**8AIIS**	**8AIVS**	**8TCS**	**6RTD**	**8AOI**	**8AOV**
Electrostatic Discharge	IEC 61000-4-2	8KV Air	A	A	A	A	A	A	A	A	A	A
		4KV Contact	A	A	A	A	A	A	A	A	A	A
Radiated Field	IEC 61000-4-3	10V/m	A	A	A	A	A	A	A	A	A	A
Fast Transients	IEC 61000-4-4	Power 2KV	A	A	A	A	B	B	B	B	A	A
		I/O 1KV	A	A	A	A	B	B	B	B	A	A
Surge	IEC 61000-4-5	Power 1KV/2KV	A	A	A	A	A	A	A	A	A	A
RF Conducted	IEC 61000-4-6	Power 3 Vrms	A	A	A	A	A	A	A	A	A	A
Voltage Interrupt	IEC 61000-4-11	0.5cycle 100%	A	A	A	A	A	A	A	A	A	A
Voltage changes, flicker	IEC 61000-3-3		A	A	A	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	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

6-1 EMC Test Results

6.4 CE Conformity Certificate

BrainChild Electronic Co., Ltd.

209, Chung Yang Rd. Nangang Dist. Taipei, Taiwan
Tel : 886-2-2786-1299   Fax : 886-2-2786-1395

偉林電子股份有限公司
115 台北市南港區重陽路 209 號
E-mail: sales@brainchild.com.tw
Website: www.brainchild.com.tw

CE Declaration of Conformity

We, Brainchild Electronic Co., Ltd. declare that our product:

Ethernet IO Modules

with the following model designation

**IO-16DI-E, IO-16DO-E, IO-4RO-E, IO-8DIO-E, IO-8AIIS-E, IO-8AIVS-E,
IO-8TCS-E, IO-6RTD-E, IO-8AOI-E, IO-8AOV-E**

Is herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility **[2014/30/EU]** and Low-voltage Directive **[2014/35/EU]**. For the evaluation regarding the Directives, the following standards were applied:

EMC:
EN 61326-1: 2013
CISPR 11: 2009 +A1: 2010 [Group 1, Class A]
EN 61000-3-2: 2014 Class A
EN 61000-3-3 : 2013
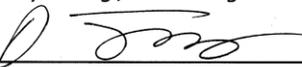
LVD:
EN61010-1:2010

Issued by: _____
Key Huang / Senior Engineer

Approved by: _____
Don Jiang / Product Manager

Human Machine Interface / Operator Interface · Recorder · Controller · GSM Controller · Energy Meter

6-1 CE Certificate

6.5 ROHS Certificate

BrainChild Electronic Co., Ltd.

209, Chung Yang Rd. Nangang Dist. Taipei, Taiwan

Tel : 886-2-2786-1299   Fax : 886-2-2786-1395

偉林電子股份有限公司
115 台北市南港區重陽路 209 號
E-mail: sales@brainchild.com.tw
Website: www.brainchild.com.tw

RoHS Certificate of Conformity

We, Brainchild Electronic Co., Ltd. declare that our product:

Ethernet IO Modules

with the following model designation

IO-16DI-E, IO-16DO-E, IO-4RO-E, IO-8DIO-E, IO-8AIIS-E, IO-8AIVS-E, IO-8TCS-E, IO-6RTD-E, IO-8AOI-E, IO-8AOV-E

Are herewith confirmed to comply with the **RoHS Directive [2011/65/EU] and amendment [2015/863/EU]** requirement without any exemptions. For the evaluation regarding the Directive, the following standard was applied: **EN IEC 63000**

Hazardous substances:
Lead[Pb] [<0.1%]
Mercury[Hg] [<0.1%]
Cadmlum[Cd] [<0.01%]
Hexavalent chromlum[Cr[VI]] [<0.1%]
Polybromlnated blphenyls[PBB] [<0.1%]
Polybromlnated blphenyl ethers[PBDE] [<0.1%]
Ftalan dl [2-etyloheksylu] DEHP [<0.1%]
Ftalan benzylu butylu BBP [<0.1%]
Ftalan dlbutylu DBP [<0.1%]
Ftalan dllzobutylu DIBP [<0.1%]

Issued by: _____
Key Huang / Senior Engineer

Approved by: _____
Don Jiang / Product Manager

Human Machine Interface / Operator Interface · Recorder · Controller · GSM Controller · Energy Meter

6-2 ROHS Certificate

6.6 REACH Certificate

BrainChild Electronic Co., Ltd.
209, Chung Yang Rd. Nangang Dist. Taipei, Taiwan
Tel : 886-2-2786-1299   Fax : 886-2-2786-1395

偉林電子股份有限公司
115 台北市南港區重陽路 209 號
E-mail: sales@brainchild.com.tw
Website: www.brainchild.com.tw

REACH Certificate of Conformity

We, Brainchild Electronic Co., Ltd. declare that our product:

Ethernet IO Modules

with the following model designation

**IO-16DI-E, IO-16DO-E, IO-4RO-E, IO-8DIO-E, IO-8AIIS-E, IO-8AIVS-E,
IO-8TCS-E, IO-6RTD-E, IO-8AOI-E, IO-8AOV-E**

Are herewith confirmed to comply with the requirements provided for in Regulation [EC] No 1907/2006 of the European Parliament and of the Council of 18 December 2006. On the Registration, Evaluation, Authorisation and Restriction of Chemicals [REACH].

Products do not contain any SVHC substances of concern.
[SVHC list can be found at: https://www.echa.europa.eu/candidate-list-table]

Issued by: _____
Key Huang / Senior Engineer

Approved by: _____
Don Jiang / Product Manager

Human Machine Interface / Operator Interface · Recorder · Controller · GSM Controller · Energy Meter

6-3 REACH Certificate