

# BrainChild

## Distributed Modbus RTU / Modbus TCP IO Modules & Data Acquisition Studio



### Features

- ◆ Modbus RTU / Modbus TCP Modules for Data Acquisition and Control Systems
- ◆ Extremely cost-effective modules for industrial measurement and monitoring applications
- ◆ A wide range of modules for various digital and analog inputs and outputs
- ◆ Wide range of baud rates available in Modbus RTU modules
- ◆ Built-in webserver in Modbus TCP modules for Monitoring real time data and configuration
- ◆ Isolated modules available for special application
- ◆ User friendly Setup software for Configuration and Troubleshooting
- ◆ Optional Data acquisition software for data acquisition and analysis on PC
- ◆ Interface with field devices to provide real-time data for SCADA/PLC/HMI
- ◆ Integration with the 3rd party softwares via Modbus RTU / Modbus TCP Protocol
- ◆ Front panel Status LEDs on every module for digital IO status, communication and power supply

## Modbus RTU / Modbus TCP Remote IO Modules

This Remote IO Modules based on RS485 Modbus RTU / Ethernet Modbus TCP communication for Data Acquisition and Control Systems.

These IO Modules offer good reliability, easy for installation, easy Maintenance, Extremely cost-effective modules for industrial measurement and monitoring applications. They can be easily added into existing RS485 or Ethernet Modbus network.

Different types of IO Modules are available for the users to select as per their requirement.

All Modules are having LED indications for monitoring the status of digital inputs & outputs and fault diagnostics. Special modules are available with interchannel isolation between channels.

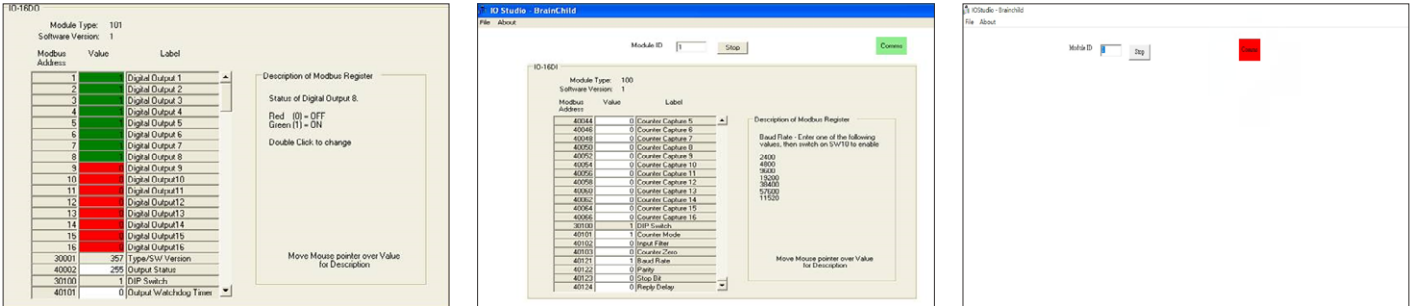
Modbus RTU modules have 2 wire RS485 Interface with Modbus RTU Protocol and Modbus TCP modules have Ethernet interface with Modbus TCP protocol.

## Selection Guide

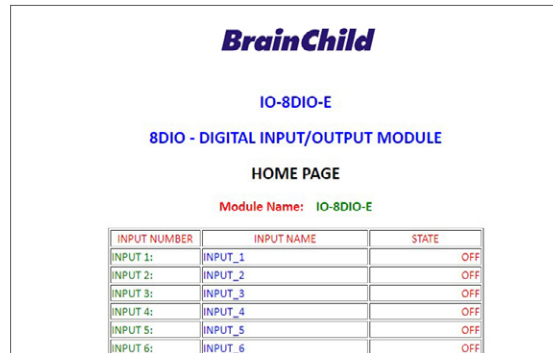
IO Type	Interface	Model No	Description
Analog Input	Ethernet Modbus TCP	IO-8AII-S-E	8 Channel Isolated Current Input Module
		IO-8AIV-S-E	8 Channel Isolated Voltage Input Module
		IO-8TCS-E	8 Channel Isolated Thermocouple Input Module
		IO-6RTD-E	6 Channel RTD Input Module
	RS-485 Modbus RTU	IO-8AII	8 Channel Current Input Module
		IO-8AII-S	8 Channel Isolated Current Input Module
		IO-8AIV	8 Channel Voltage Input Module
		IO-8AIV-S	8 Channel Isolated Voltage Input Module
		IO-8TC	8 Channel Thermocouple Input Module
		IO-8TCS	8 Channel Isolated Thermocouple Input Module
IO-6RTD	6 Channel RTD Input Module		
Analog Output	Ethernet Modbus TCP	IO-8AOI-E	8 Channel Current Output Module
		IO-8AOV-E	8 Channel Voltage Output Module
	RS-485 Modbus RTU	IO-8AOI	8 Channel Current Output Module
		IO-8AOV	8 Channel Voltage Output Module
Digital Input	Ethernet Modbus TCP	IO-16DI-E	16 Channel Digital Input Module with Counters
	RS-485 Modbus RTU	IO-16DI	16 Channel Digital Input Module with Counters
Digital Output	Ethernet Modbus TCP	IO-16DO-E	16 Channel Digital Output (Sink or NPN Transistor) Module
	RS-485 Modbus RTU	IO-16DO	16 Channel Digital Output (Sink or NPN Transistor) Module
Relay Output	Ethernet Modbus TCP	IO-4RO-E	4 Channel Relay Output Module
	RS-485 Modbus RTU	IO-4RO	4 Channel Relay Output Module
Combination Module	Ethernet Modbus TCP	IO-8DIO-E	8 Channel Digital Input / 8 Channel Digital Output (Sink or NPN Transistor) Module
		IO-8DIO	8 Channel Digital Input / 8 Channel Digital Output (Sink or NPN Transistor) Module
	RS-485 Modbus RTU	IO-DAIO	2 Channel Analog Input of Current Input (0(4)-20mA) or Voltage input (0(2)-10V), 1 Channel Analog Output of Current Output (0(4)-20mA) or Voltage Output (0(2)-10V), 4 Channel Digital Input with Counters, 2 Channel Digital Output (Sink or NPN Transistor) Module, 2 Channel RTD Input

IO Studio is a windows based standard PC Software used to configure IO Modules on the network. Once the module is connected with the software, the real-time data and the configuration of the module can be viewed on the PC for troubleshooting.

RS485 Modbus RTU Modules can be connected to the PC by using RS485 serial port or RS232 to RS485 serial converters or USB to RS485 serial converter. The address of the RS485 module can be set on the module by the dip switches on the front panel.



The Ethernet module can be also configured via web page tool shown below.



← Web page configuration of Ethernet IO module

## General Specifications

Parameters		Modbus RTU IO Modules	Modbus TCP IO Modules
Interface		RS-485 Modbus RTU	Ethernet Modbus TCP
Communication Speed		2400, 4800, 9600, 19200, 38400, 57600, 115200, 187500 BPS	10 / 100 MBPS
Operating Temperature		-10°C to 50°C	
Storage Temperature		-40°C to 85°C	
Humidity		Up to 95% Non-condensing	
Mounting		DIN Rail	
Weight		105 grams	
Dimensions (W*H*D)		23 * 109 * 98 mm	
Approval Standard	Safety	IEC 950	
Connectors	EMC	IEC 61000-4-2-A1 Level2, IEC 61000-4-3-A1 Level2, IEC 61000-4-4 Level3, CISPR 11:1997-A1, EN55011:1998 Group1 Class A	
	Input	18 Way screw connector on front	
	Communication	4 Pin Connector on bottom side of unit	RJ45 on topside of the unit
	Logic Power		4 Pin Connector on bottom side of unit

# Specifications

## Analog Input Modules

Parameters		Model No	IO-8AII	IO-8AII-S	IO-8AII-S-E	IO-8AIV	IO-8AIV-S	IO-8AIV-S-E
Type of Input			Current			Voltage		
No of Channels			8			8		
Power Supply	Logic Supply Voltage		12 to 24 VDC			12 to 24 VDC		
	Logic Supply Current		27mA @ 12V / 16mA @ 24V	58mA @ 12V / 31mA @ 24V	105mA @ 12V / 54mA @ 24V	27mA @ 12V / 16mA @ 24V	58mA @ 12V / 31mA @ 24V	105mA @ 12V / 54mA @ 24V
	Field Supply Voltage		12 to 24 VDC	N.A.		12 to 24 VDC	N.A.	
	Field Supply Current		8mA @ 12V / 15mA @ 24V	N.A.		8mA @ 12V / 15mA @ 24V	N.A.	
Voltage Input Range			N.A.			0(2) - 10 VDC or 0(1) - 5 VDC		
Current Input Range			0(4) to 20mA			N.A.		
RTD Type			N.A.			N.A.		
Thermocouple Type			N.A.			N.A.		
Cold Junction			N.A.			N.A.		
Burnout Detection			Yes			Yes		
Accuracy			± 0.2% FSR			± 0.2% FSR		
Resolution			12 Bit	16 Bit		12 Bit	16 Bit	
Sampling Rate			12.5 Samples / Second			12.5 Samples / Second		
Isolation between Channels			N. A.	350 V Peak		N. A.	350 V Peak	
Isolation between Field and Logic			1500 VRMS			1500 VRMS		
Input Impedance			250Ω			20KΩ	110KΩ	
Drift			50 ppm/°C			100 ppm/°C		

Parameters		Model No	IO-8TC	IO-8TCS	IO-8TCS-E	IO-6RTD	IO-6RTD-E
Type of Input			Thermocouple, mV			2 or 3 Wire RTD	
No of Channels			8			6	
Power Supply	Logic Supply Voltage		12 to 24 VDC			12 to 24 VDC	
	Logic Supply Current		62mA @ 12V / 33mA @ 24V	58mA @ 12V / 31mA @ 24V	105mA @ 12V / 54mA @ 24V	87mA @ 12V / 45mA @ 24V	115mA @ 12V / 58mA @ 24V
	Field Supply Voltage		N.A.			N.A.	
	Field Supply Current		N.A.			N.A.	
Voltage Input Range			0 to 50mV, ± 100mV			N.A.	
RTD Type			N.A.			Pt100, Ni120, Pt1000, Ni1000-DIN, Ni1000-Landys & Gyr, 10 to 400Ω, 100 to 4000Ω	
Thermocouple Type			J, K, E, T, N, B, S, R, C, D, G			N.A.	
Cold Junction			CJC Error: ±0.5°C Typically After 30 Minutes warm up time.			N.A.	
Burnout Detection			Yes			Yes	
Accuracy			± 0.05% FSR			± 0.05% FSR	
Resolution			0.1°C			0.1°C	
Sampling Rate			42 Samples / Minute	37 Samples / Minute		31 Samples / Minute	
Isolation between Channels			N. A.	350 V Peak		N.A.	
Isolation between Field and Logic			1500 VRMS			1500 VRMS	
Drift			100 ppm/°C			100 ppm/°C	

## Digital Output Modules

Parameters		Model No	IO-16DI	IO-16DI-E	IO-8DIO	IO-8DIO-E
Type of Module			Digital Input		Digital Input / Digital Output	
No of Channels			16		8 Digital Inputs / 8 Digital Outputs	
Power Supply	Logic Supply Voltage		12 to 24 VDC		12 to 24 VDC	
	Logic Supply Current		30mA @ 12V / 17mA @ 24V	75mA @ 12V / 39mA @ 24V	23mA @ 12V / 14mA @ 24V	75mA @ 12V / 39mA @ 24V
	Field Supply Voltage		N. A.		12 to 24 VDC	
	Field Supply Current		N.A.		6mA @ 12V / 6mA @ 24V	
No of Digital Inputs			16		8	
Input Voltage Range			12 to 24 VDC		12 to 24 VDC	
Input current per input			5mA @ 12VDC / 11mA @ 24VDC		5mA @ 12VDC / 11mA @ 24VDC	
Input Impedance			2200Ω		2200Ω	
Counters (Filter disabled)	Inputs		1 to 16		1 to 8	
	Resolution		32 Bits		32 Bits	
	Frequency		1KHz (Max)		1 KHZ (Max)	
	Pulse Width		500μs (min)		500μs (min)	
	Retentive Counter		Yes		No	
Output Type			N.A.		Open Collector Transistor	
No of Outputs					8	
Output Specification					SinK (NPN)	
Output Voltage					36V DC (max)	
Vceon					1.1V (max)	
Load Current					100mA Per Output	
Isolation between Field and Logic					1500 VRMS	

		IO-4RO	IO-4RO-E	IO-16DO	IO-16DO-E
Type of Module		Relay Output		Digital Output	
No of Channels		4		16	
Power Supply	Logic Supply Voltage	24 VDC		12 to 24 VDC	
	Logic Supply Current	42mA	75mA	23mA @ 12V / 14mA @ 24V	75mA @ 12V / 39mA @ 24V
	Field Supply Voltage	N. A.		12 to 24 VDC	
	Field Supply Current	N.A.		6mA @ 12V / 6mA @ 24V	
Output Type		Relay		Open Collector Transistor	
No of Outputs		4		16	
Output Specification		Form C		SinK (NPN)	
Output Voltage		N.A.		36V DC (max)	
Vceon		N.A.		1.1V (max)	
Load Current		N.A.		100mA Per Output	
Relay Rating		0.5A @ 220VAC / 1A @ 28VDC	1A @ 220VAC / 2A @ 24VDC	N.A.	
Isolation between Channels		1000 VRMS		N.A.	
Isolation between Field and Logic		1000 VRMS		1500 VRMS	

## Analog Output Module

Parameters		Model No	IO-8AOI	IO-8AOI-E	IO-8AOV-E	IO-8AOV
No of Channels			8		8	
Interface			RS-485 Modbus RTU	Ethernet Modbus TCP	RS-485 Modbus RTU	Ethernet Modbus TCP
Communication Speed			2400, 4800, 9600, 19200, 38400, 57600, 115200, 187500 BPS	10 / 100 MBPS	2400, 4800, 9600, 19200, 38400, 57600, 115200, 187500 BPS	10 / 100 MBPS
Power Supply	Logic Supply Voltage		12 to 24 VDC		12 to 24 VDC	
	Logic Supply Current		32mA @ 12V / 18mA @ 24V	67mA @ 12V / 35mA @ 24V	32mA @ 12V / 18mA @ 24V	67mA @ 12V / 35mA @ 24V
	Field Supply Voltage		24 VDC		24 VDC	
	Field Supply Current		175 mA max		85 mA max	
Type of Output			Current		Voltage	
Voltage Output Range			N.A.		0(2)~10V	
Current Output Range			0(4)~20mA		N.A.	
Accuracy			0.05% of Span		0.05% of Span	
Resolution			12 Bit		12 Bit	
Load			1000 Ω max. @ 24VDC, 500 Ω max. @ 12VDC		2000 Ω min	
Isolation Between Field and Logic			1500 VRMS		1500 VRMS	
Drift			100 ppm/°C		100 ppm/°C	

## Serial to Ethernet Converter

Parameters		Model No	PC-E
Power Supply			90mA @ 10VDC / 40mA @ 26VDC
Ethernet	Communication Speed		10/100Base-TX
Serial	RS232		3 Wire , TX,RX,GND
	RS485		2 Wire Multi drop twisted pair
	Baud Rate		2400, 4800, 9600, 19200, 38400, 57600, 115200 BPS
	Data Bit		5, 6, 7, 8
	Parity		None, Even, Odd
	Stop Bit		1 or 2
Protection			Input fault protection to 70 VDC, 16 KV HBM protection
Dimensions (L*W*H)			70 * 59.5 * 106 mm
Connector			8 Way Screw Connector
Application			Connect RS-485 IO modules to the PC via Ethernet, 10/100 Base-T Modbus RTU to Modbus TCP, UDP, Transparent Mode
Sockets			Multisocket, Share date to maximum 4 masters on the Ethernet side

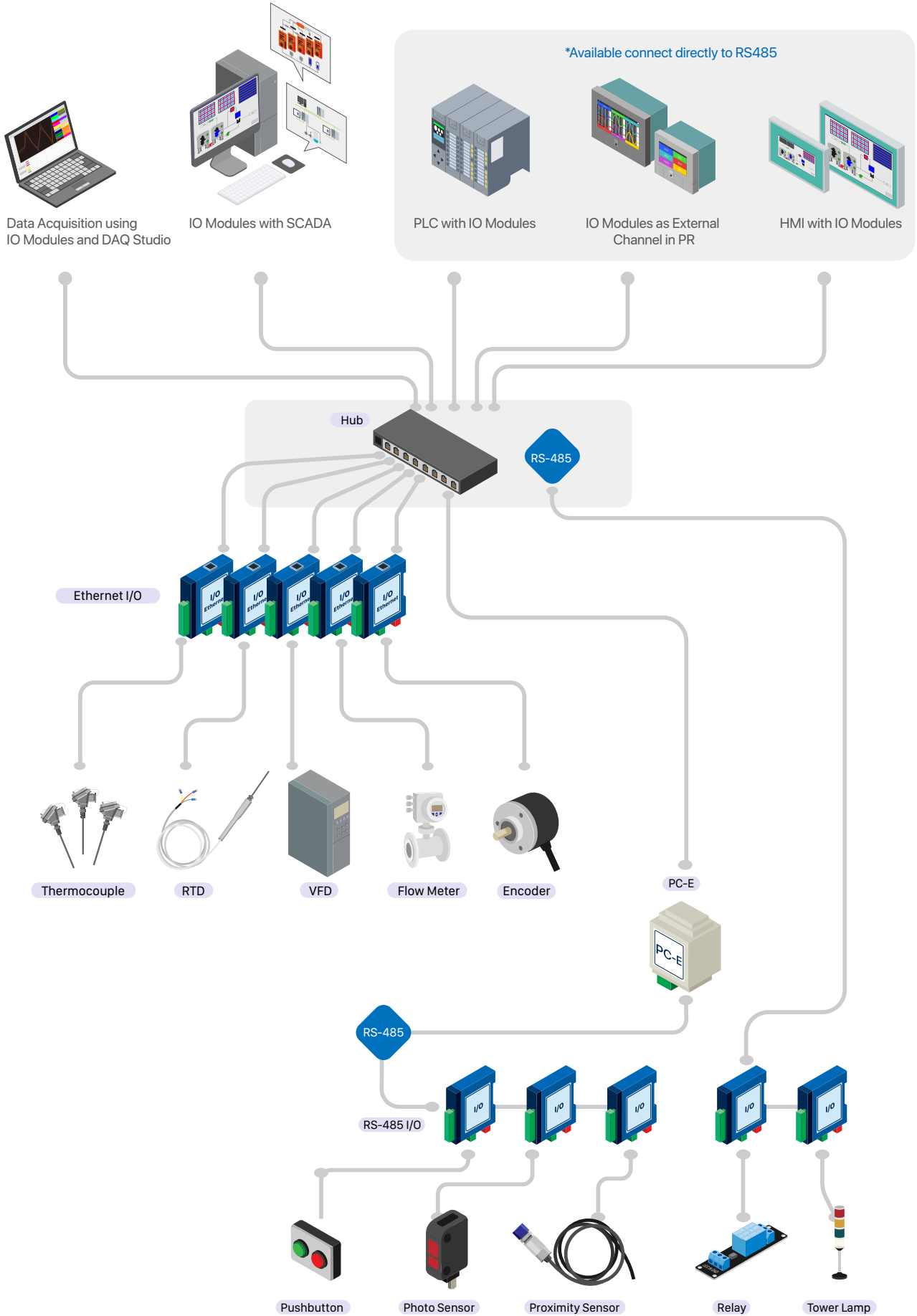


Ethernet Converter PC-E →

## Combination Module

Parameters		Model No	IO-DAIO
Power Supply	Logic Supply Voltage		12 to 24 VDC
	Logic Supply Current		115mA @ 12V / 58mA @ 24V
	Field Supply Voltage		24 VDC
	Field Supply Current		25mA
Analog Inputs (Voltage & Current)	No of Inputs		2
	Input Range		0(4) to 20mA, 0(2) to 10V DC
	Resolution		12Bit
	Input Impedance		250Ω for Current Inputs, 190KΩ for Voltage Inputs
	Isolation Between Field and Logic		1000 VRMS
	Accuracy		0.2% of FSR
RTD Inputs	No of Inputs		2
	Types		Pt100, Ni120, Pt1000, Ni1000-DIN, Ni1000-Landys&Gyr, 10 to 400Ω, 100 to 4000Ω
	Sensor Type		2 or 3 Wire
	Resolution		0.1°C
	Drift		100 ppm/°C
	Line Resistance Effect		< 0.1°C Balanced
	Max. line resistance		100Ω
	Isolation Between Field and Logic		1500VRMS
	Accuracy		0.3°C
Analog Outputs	No of Inputs		1
	Types		0(4) to 20mA, 0(2) to 10V DC
	Accuracy		0.05% of Span
	Resolution		12 Bit
	Drift		100 ppm/°C
	Load		1000 Ω max. @ 24VDC 500 Ω max. @ 12VDC for Current Output, 2000Ω min for Voltage Output
	Max. line resistance		100Ω
	Accuracy		0.05% of span
Digital Inputs	Digital Inputs	No of Inputs	4
		Input Voltage Range	10 to 26 VDC
		Input current Per Input	4mA@12VDC / 8mA @24VDC
	Counters	Inputs	1 to 4
		Resolution	32 Bits
		Frequency	1KHz (Max)
		Pulse Width	500μs (min)
	Retentive Counter	No	
Digital Outputs	No of Inputs		2
	Output Type		Open Collector
	Output Specification		Sink (NPN)
	Output Voltage		36 VDC
	Vceon		1.1 V Max
	Load Current		100 mA per output

# System Configuration





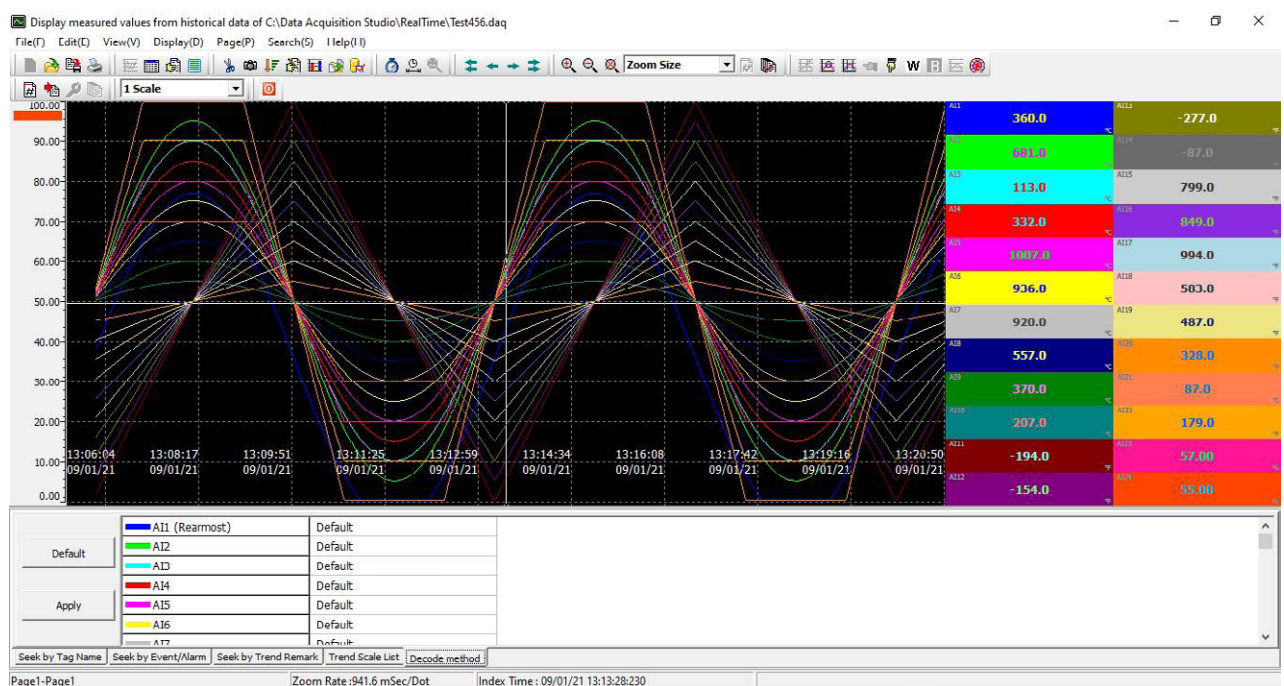
## Data Acquisition Studio (DAQ)

This is a single data acquisition Software for Recorders, Temperature Controllers, IO Modules, HMI and 3rd party devices with Modbus Protocol. User friendly PC based real-time data monitoring and data acquisition software.

### Real Time Viewer

#### ■ Features

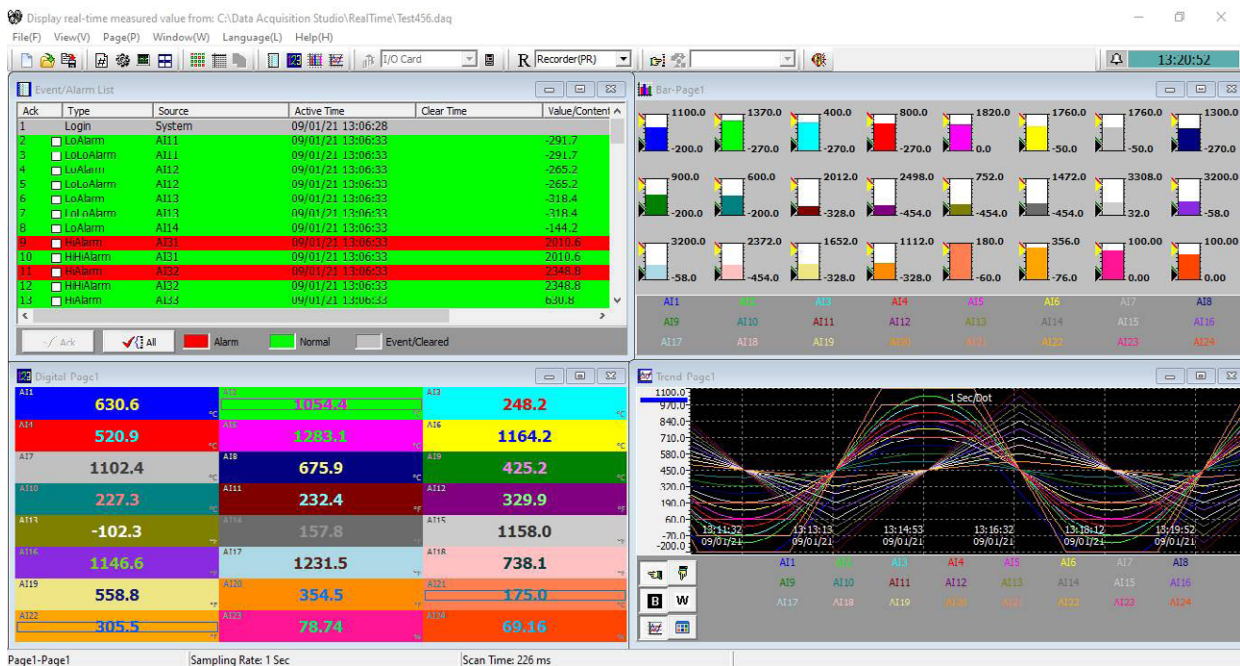
- ◆ Maximum tags: 2048
- ◆ Real time trends, Real time bar graphs, Real time digital values
- ◆ Real Time Alarms & Historical Alarms
- ◆ Number of display pages: 200 Maximum
- ◆ Number of Pens (Tags) display per page: 1 to 24 Configurable
- ◆ Timers: 100, Counters: 50 & Totalizers: 50
- ◆ Log Speed: 1, 2, 5 10, 30, 60 and 120 Sec
- ◆ Log trigger type: By time, By value change
- ◆ Log Methods: Instant, Average, Minimum & Maximum
- ◆ Project Auto configuration option available for Temperature Controllers, Recorders, IO Modules and HMI.
- ◆ Mathematic channels to write expression or formulae
- ◆ Data Types: 2 byte, 4 byte and 8 byte, Decimal: 0 to 4
- ◆ Alarms by Email and 100 customized comments for Alarms
- ◆ Event Types: H, HH, L, LL, Rate of increase(R), Rate of decrease(r), Dev+, Dev- and Error
- ◆ Number of events per Analog Channel: 5, Number of Jobs/event: 2
- ◆ Four Communication Banks via serial and Ethernet Ports for Modbus RTU & Modbus TCP Protocols.
- ◆ Support Dynamic Data Exchange (DDE) for Excel.
- ◆ Available in 20 languages.



## Historical Viewer

### Features

- ◆ Display Historical trend, Display Historical alarms/Events
- ◆ Display Reports (Daily, Weekly & Monthly)
- ◆ Display Historical values in tabular column
- ◆ Mark Remarks on data
- ◆ Search data by Time, Time Period, Event/Alarm, Tag wise and Remark
- ◆ View trends both Horizontally and Vertically
- ◆ Zoom out & Zoom in
- ◆ Display view options available at 100msec/dot, 1 sec/dot, 2 sec/dot, 5 sec/dot, 10 sec/dot, 20sec/dot, 30 sec/dot, 1min/dot, 2 min/dot, 5 min/dot, 10 min/dot, 30 min/dot, 10 min/page, 30 min/page, 1 hr/page, 2 hr/page, 4 hr/page, 8 hrs/page, day/page, week/page and month/page
- ◆ Display white back ground/black background
- ◆ Print trend view, Event/Alarm list, Reports & Tag Values
- ◆ Export data and alarms/events to CSV files. (Specify time or time period or all)
- ◆ Automatic import and export option.



# BrainChild

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