

# User Manual

## Paperless Recorder/Datalogger PPR 500



Version 2.2.1

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## PPR 500

### 1. Safety Symbols

The following symbols may be seen on the user manual or recorder labeling.



**Caution**



**Protective Earth**



**DC Supply**

### 2. Safety Notes and Precautions

1. The protective earth terminal should be connected first before any other connection is made. To avoid making the recorder dangerous under fault conditions, any interruption of the protective Earth conductor inside or outside the recorder is prohibited. Even in the case of a portable unit, the protective earth terminal must remain connected if the recorder is connected to any hazardous voltage.
2. Keep signal and supply voltage wiring separated from one another. If this is impractical, use shielded cables for signal wiring. Double insulation should be used for signal wiring when the recorder is being used with hazardous voltage.
3. Do not use the recorder where there is high vibration, or high magnetic field, this could cause damage or error of measurement.
4. All maintenance or repairs should be carried out with power disconnected, to avoid personal injury, or damage to the unit.
5. In areas with conductive pollution, adequate ventilation, filtering and sealing need to be installed.

6. When cleaning the recorder, handle carefully and use soft dry cloth. Avoid the use of abrasives or any sharp and hard objects, which would damage the display.
7. Do not operate the recorder if any part has been removed or disassembled. Consult your nearest dealer at once.

### **3. Static Electricity**

Appropriate precautions must be taken when handling the recorder. The circuit board, components are susceptible to damage caused by electrostatic discharge. Take static electricity precautions whilst handling and inserting USB memory into the recorder.

.

## 4. General Description

### 4.1 Unique features of recorder

The PPR 500 is a well-designed new generation paperless recorders with many outstanding features as follows:

#### **Hardware**

- Three sizes of 5.6
- PPR 500, with 5.6" display, 6, 12 , 18 up to 24 universal analog inputs
- TFT Color LCD, Touch screen & high resolution
- 100 milli second sample rate and data logging
- High accuracy 24-bit A-D Analog Input
- 16-bit D-A Analog Output
- Digital input, maximum 100 Hz.
- Plug & play I/O cards (AI, AO, DI, DO) for easy expansion
- On board SD card for Internal memory
- External solid storage media USB flash memory in high capacity
- 171 mm short depth
- Ethernet as standard and optional RS-232/422/485 communication
- Two USB Host ports for downloading the data or connect to Printer
- IP65 / NEMA 4X water-resistance

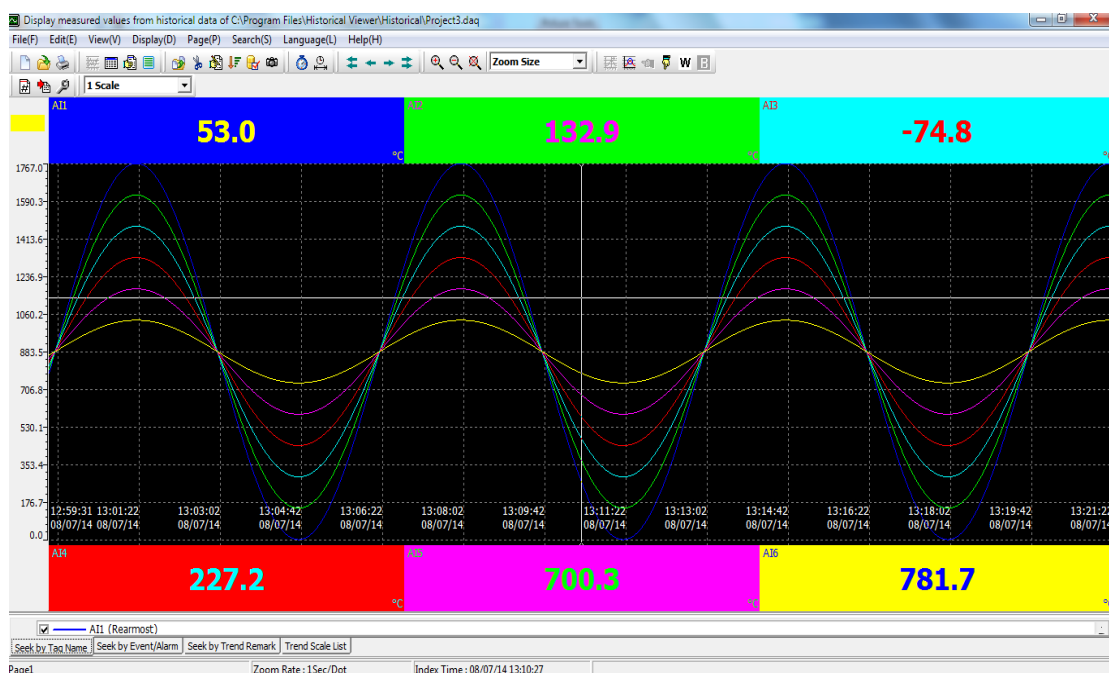


#### **Firmware and PC Software**

- Free Basic software for configuration, Historical viewer
- Extensive Software ,Data Acquisition Software for configuration, Historical viewer and Real time viewer
- Additional Panel Studio Software for editing customized Displays
- Display values in Digital, Real time trends, Historical trends, Bar graphs etc
- Real time and Historical alarms
- Event management, Jobs linked with events
- Reports (Daily, Weekly and Monthly)
- Timers, Optional -Counters, Totalizers, Math channels and CFR-21

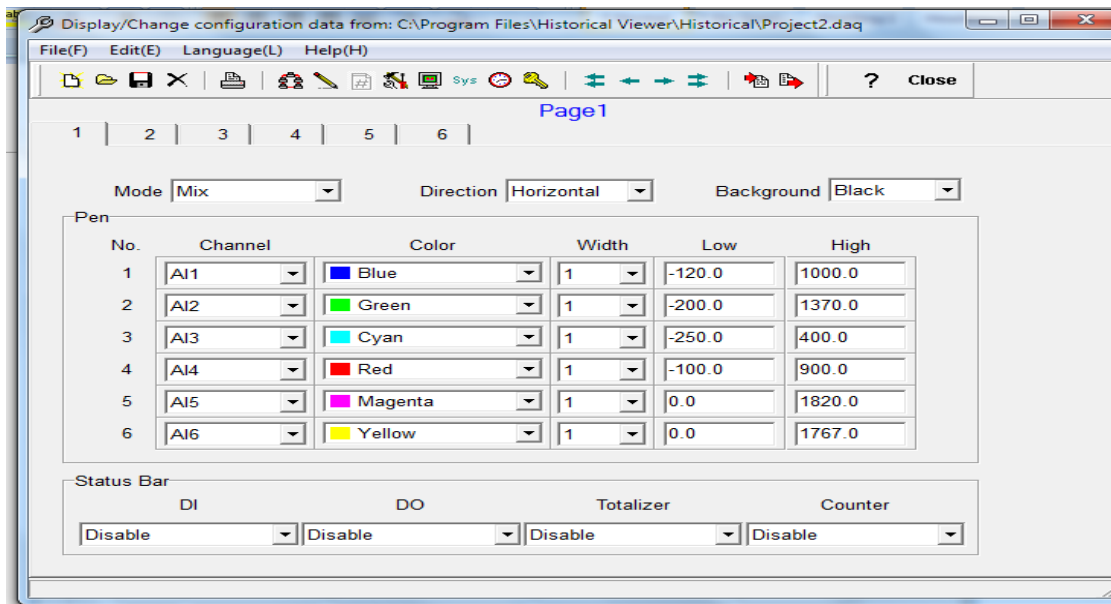
- Customized messages for the alarms
- Alarms by email directly from paperless recorder
- Batch control, log data in batches
- 100 msec. data logging and historical data archival tools
- Display screens rotation
- Data dynamic exchange feature via PC software
- Search data with reference to time and period and Export to spread sheets
- Data logging by value change or time base
- Start/Stop data logging functions which can be linked with real time clock or events

Historical Viewer in Free and Extensive Software:

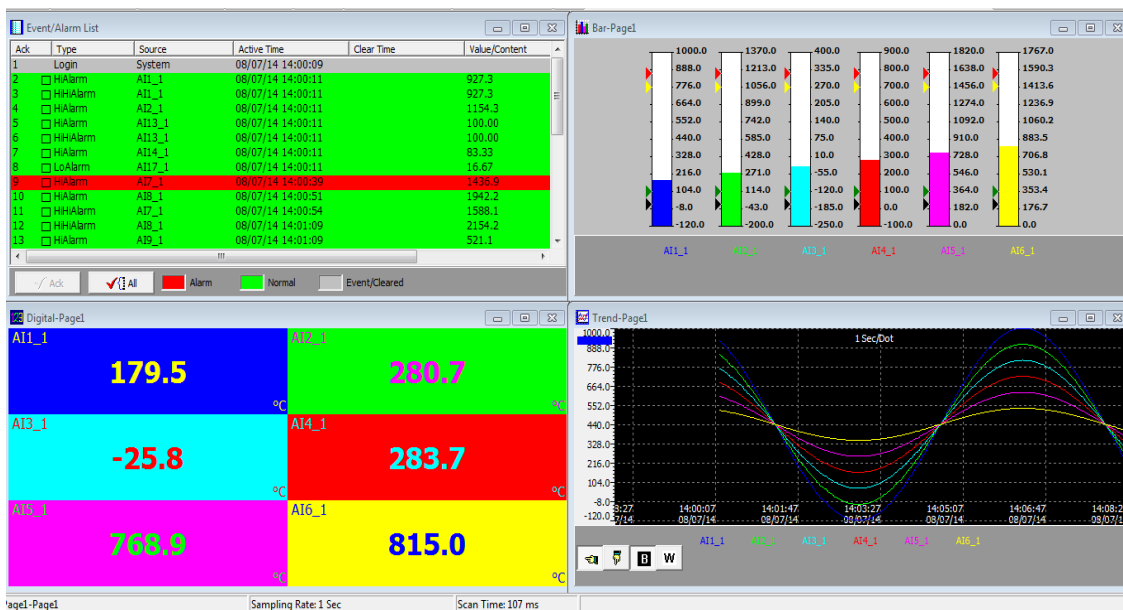




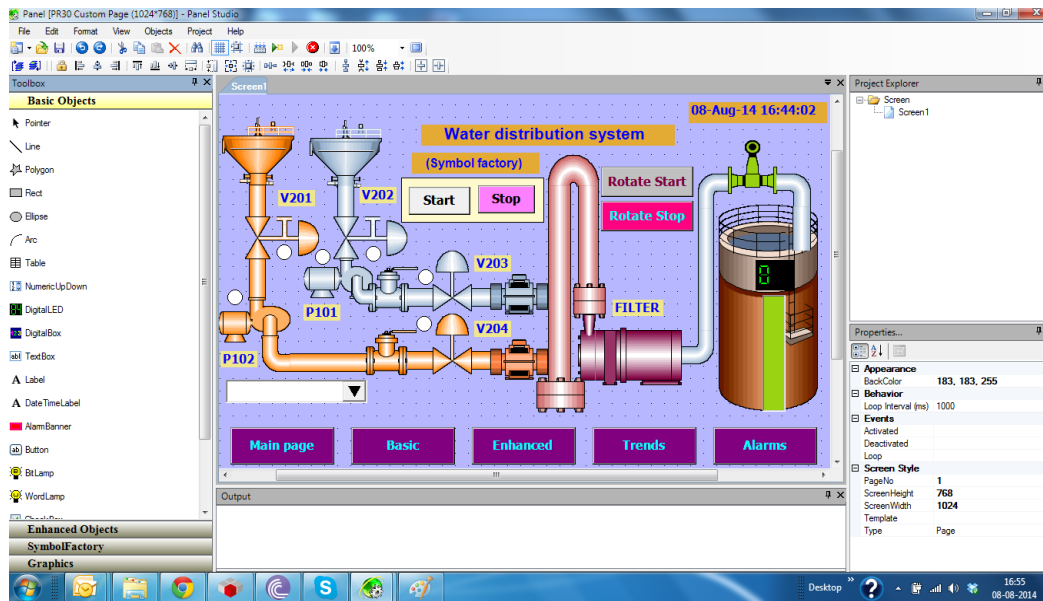
## Editing Configuration in Free and Extensive Software:



## Extensive Software Data Acquisition Studio with Real-time Viewer:



## Panel Studio Software to Edit Custom Displays:



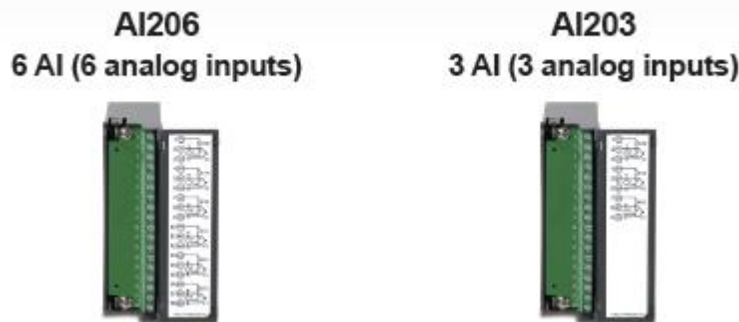
## 4.2 Comparison of PPR series Recorders

Description	PPR200	PPR500
Display Size	6,1"	5.6"
Analog Inputs (Maximum)	18	24
Math Channels (Maximum)	18	40
External Channels (Other devices)	0	48
Total Pages	6	20
Pens/Page (Maximum)	6	6
Batches (Maximum)	0	1

### 4.3 Expandable Input and Output cards

The recorder is equipped with rear expansion slots, which work flexibly with the following plug & play I/O cards.

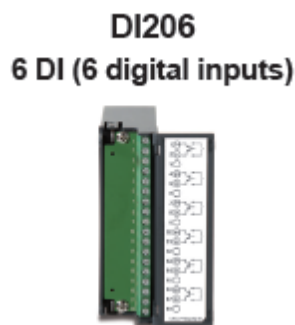
**Analog Input cards** (part number AI206 & AI203): These two cards are used for 6 & 3-channel analog input. Each input is isolated from each other to avoid noise and to ensure stable measurement.



**Relay Output card** (RO206): Each card includes 6 alarm relays. Contacts are rated 5 Amp/240 VAC



**Digital Input card** (DI206): Each card includes 6 channels. Logic Low: -5V minimum, 0.8V maximum, Logic High: 3.5V minimum, 24V maximum



**Relay Output and Digital Input Card (RD233):** Each Card includes 3-digital Inputs and 3-Relay Outputs. For Digital Inputs , Logic Low: -5V minimum, 0.8V maximum, Logic High: -3.5V minimum, 24V maximum. For Relay Outputs , the Contacts are rated 5 Amp/240 VAC

**RD233**  
3 relays + 3DI



**Analog Output cards (AO206):** Each card includes 6 channels. They are used for 4-20mA, 0-20mA current output, 0-5V, 1-5V, 0-10VDC voltage output.

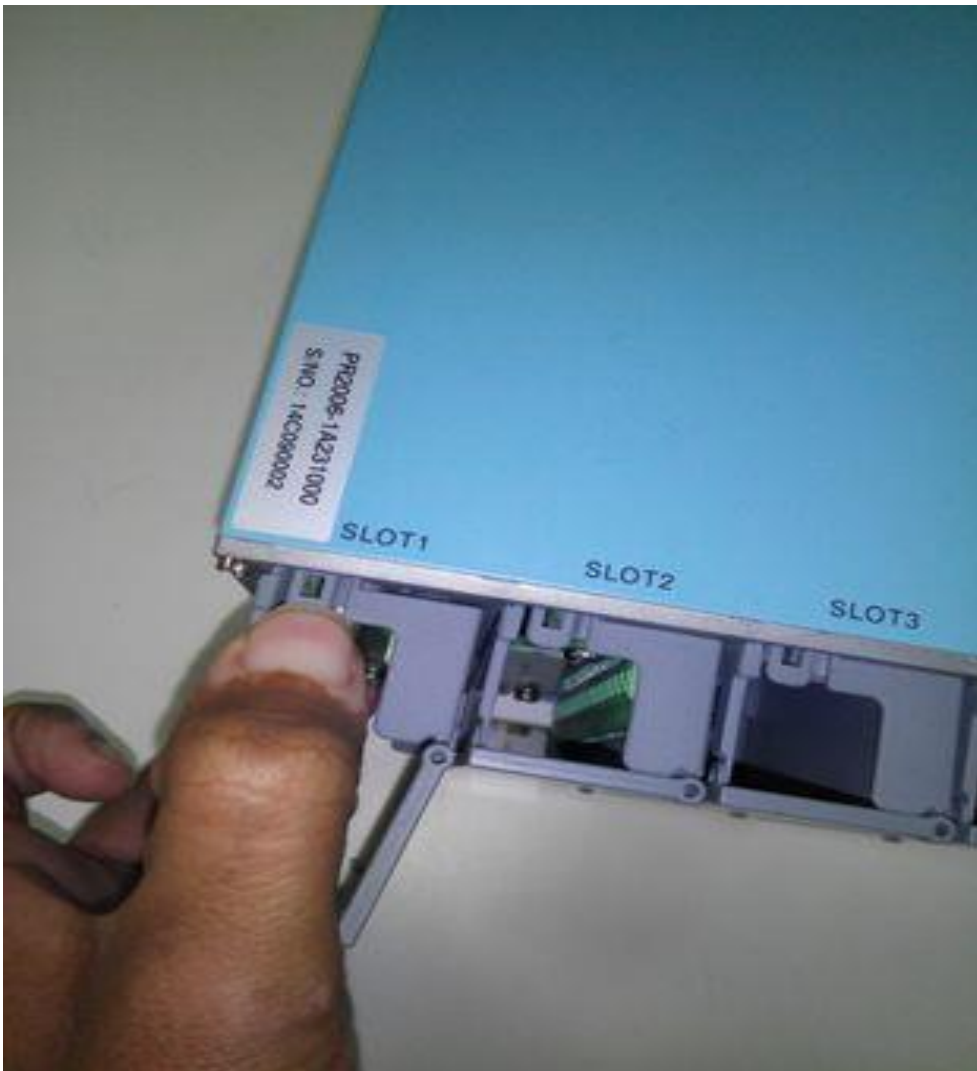
**AO206**  
6 AO (6 analog outputs)



**Note 1:** The IO Cards should not be removed or Inserted to the PR when the Power is ON. This should be carried out at Power OFF Condition only.

**Note 2:** For Thermocouple Inputs, 1 hour inputs warm up is necessary for first initial set up.

**Note 3:** Information in regards removing the IO Cards from PR. For removing the IO Card we need to press the lock on the top and bottom of the IO Card and then pull to remove it. Failing to do so will damage the IO Cards. Please follow the below pictures for more information.



#### 4.4 Communication

The standard communication interface is Ethernet with protocol IEEE 802.3 – 10/100 BaseT. other options are RS-232 / RS-422 / RS-485.

#### 4.5 External Storage media

We have got two types External storage Media, SD card and USB for the recorder. If the recorder is used with **6-channel inputs**, an easy chart to show the maximum days

SD card	16GB	32GB
Log speed		
1 second	15808 days	31616 days
10 seconds	158032 days	316064 days
120 seconds	1896304 days	3792608 days

\* The above is an approximation  
Each record of data uses 2 bytes or 4 bytes of memory.

For ex: Selected data size = 2 bytes

If the Log Speed ( the recording speed of measured data ) is set to the fastest speed at 1 second per data, then for a six channels, 16GB SD Card will last approximately 15808 days [= 16GB / ( 2 bytes x 24 hours x 60 minutes x 60 seconds x 6 Channels )].

**The following formula** is to calculate how many days the USB disk could do saving before it is full.

***The ? days = (The capacity of SD card memory x Log Speed) / ( 2 x no. of hours per day x 60 x 60 x Number of channels )***

***If the User is using USB to store data, To avoid losing recorded data while transferring to PC, it is necessary to insert USB memory back again into the recorder soon after loading recorded data onto PC.***

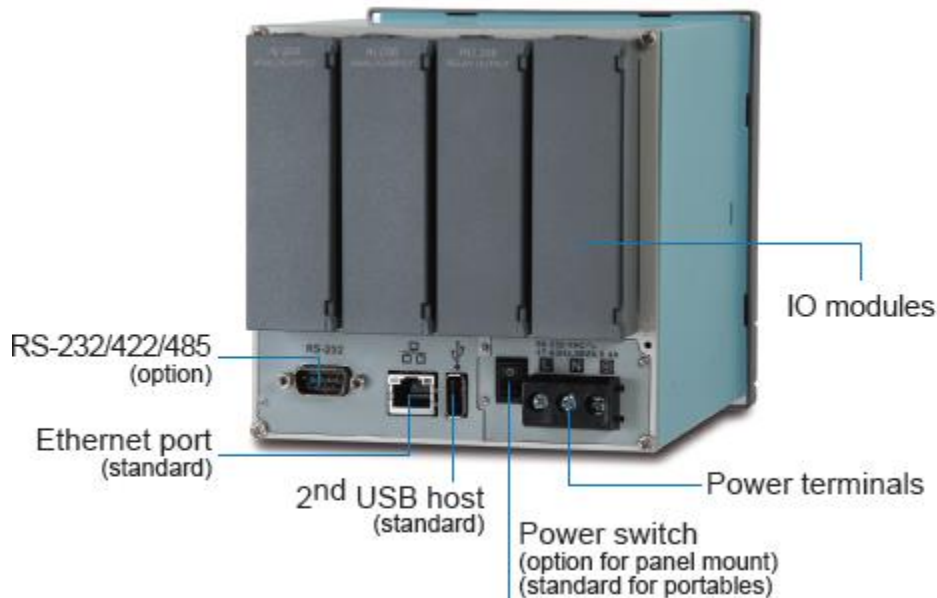
## 4.6 Smart Mechanism

The recorded data is stored in the manufacturer's special binary format. It is not possible to manipulate or modify the recorded data. This feature fully guarantees the security of the data.

Front View:



Rear View:



## 4.7 Ordering code and accessories

### 4.7.1 Ordering code PPR 500

Order example: PPR 500-1-A-A-A-A-0-1-0

#### Power

- 1 230VAC
- 2 24VDC

#### Function Slot 1

- |    |                                      |       |
|----|--------------------------------------|-------|
| -A | 3 universal inputs analog            | AI203 |
| -X | 6 universal inputs analog            | AI206 |
| -B | 6 digital inputs                     | DI206 |
| -C | 6 relay outputs                      | RO206 |
| -E | 3 relay outputs and 3 digital inputs | RD233 |
| -F | 6 universal outputs mA and V         |       |

#### Function Slot 2

- |    |                                      |       |
|----|--------------------------------------|-------|
| -A | 3 universal inputs analog            | AI203 |
| -X | 6 universal inputs analog            | AI206 |
| -B | 6 digital inputs                     | DI206 |
| -C | 6 relay outputs                      | RO206 |
| -E | 3 relay outputs and 3 digital inputs | RD233 |
| -F | 6 universal outputs mA and V         |       |

#### Function Slot 3

- |    |                           |       |
|----|---------------------------|-------|
| -A | 3 universal inputs analog | AI203 |
| -X | 6 universal inputs analog | AI206 |



- |    |                                      |       |
|----|--------------------------------------|-------|
| -B | 6 digital inputs                     | DI206 |
| -C | 6 relay outputs                      | RO206 |
| -E | 3 relay outputs and 3 digital inputs | RD233 |
| -F | 6 universal outputs mA and V         |       |

#### **Function Slot 4**

- |    |                                      |       |
|----|--------------------------------------|-------|
| -A | 3 universal inputs analog            | AI203 |
| -X | 6 universal inputs analog            | AI206 |
| -B | 6 digital inputs                     | DI206 |
| -C | 6 relay outputs                      | RO206 |
| -E | 3 relay outputs and 3 digital inputs | RD233 |
| -F | 6 universal outputs mA and V         |       |

#### **Option 1**

- 0 ethernet
- 1 ethernet and RS232
- 2 ethernet and RS422/485

#### **Option 2 firmware**

- 0 standard
- 1 standard, math, counter, totalizer, batch, CFR21part11

#### **Option 3 housing**

- 0 no option 3
- 1 bench top portable style with handle

#### 4.7.2 Accessories:

Part no.	Descriptions
AI203	3-channel analog input card (TC, RTD, mA, V, mV)
AI206	6-channel analog input card (TC, RTD, mA, V, mV)
RO206	6-channel relay output card
DI206	6-channel digital input card
RD233	3-channel Relay output and 3-channel digital input card
AO206	6-channel analog output card

#### Notes:

- ◆ The rear Slots of the recorder will only accept optional cards of input, output in any combination based on selected model.
- ◆ The basic PC software is supplied free together with recorder. There is an additional charge for the extensive Data Acquisition Software supplied with communication of RS-232/422/485 or Ethernet.

#### 4.8 Specifications

##### Power:

##### PPR 500:

90-250VAC, 47-63Hz, 52VA, 26W maximum  
11-36VDC, 26VA, 26W maximum

##### Display:

LCD, 640 x 480 pixel resolution, 65K color

##### Memory:

256MB storage memory on board.

##### Analog Input Cards (AI20X):

**Channels:** AI203 ~ 3 channels, AI206 ~ 6 channels

**Resolution:** 24 bits

**Sampling Rate:** 10 times/ second

**Maximum Rating:** RTD input  $\pm 20V$   
T/C and Voltage input  $\pm 65V$   
mA input  $\pm 10V$

**Temperature Effect:**  $\pm 0.1\mu V$   $\pm 15PPM$  of reading for all inputs except mA,  
 $\pm 30PPM$  of reading for mA input

##### Sensor Lead Resistance Effect:

T/C: 0.32PPM of reading/ohm 3-wire RTD: 2.6 °C /ohm of resistance difference of two leads (Based on °C measurement temperature for PT100)

2-wire RTD: 2.6 °C /ohm of resistance sum of two leads (Based on °C measurement temperature for PT100)

**Burn-out Current:** 10uA

**Common Mode Rejection Ratio (CMRR):** 120dB

**Normal Mode Rejection Ratio (NMRR):** 55dB

**Isolation Breakdown Voltage between channels:** 1500VAC min.

**Sensor Break Detection:**

Sensor opened for TC, RTD and mV inputs, below 1 mA for 4-20mA input, below 0.25V for 1-5V inputs, unavailable for other inputs

Sensor Break Responding Time: Within 1 seconds for TC, RTD and mV inputs, 0.1 second for 4-20 mA and 1-5V inputs

**Characteristics:**

Type	Range	Accuracy at 25 °C	Input Impedance
J	-120 ~ 1000 °C (-184 ~ 1832 °F)	±1 °C	3.12MΩ
K	-200 ~ 1370 °C (-328 ~ 2498 °F)	±1 °C °	3.12MΩ
T	-250 ~ 400 °C (-418 ~ 752 °F)	±1 °C	3.12MΩ
E	-100 ~ 900 °C (-148 ~ 1652 °F)	±1 °C	3.12MΩ
B	0 ~ 1820 °C (32 ~ 3308 °F)	±2 °C (200 ~ 1820 °C)	3.12MΩ
R	0 ~ 1768 °C (32 ~ 3214 °F)	±2 °C	3.12MΩ
S	0 ~ 1768 °C (32 ~ 3214 °F)	±2 °C	3.12MΩ
N	-250 ~ 1300 °C (-418 ~ 2372 °F)	±1 °C	3.12MΩ
L	-200 ~ 900 °C (-328 ~ 1652 °F)	±1 °C	3.12MΩ
U	-200 ~ 600 °C (-328 ~ 1112 °F)	±1 °C	3.12MΩ
P	0 ~ 1395 °C (32 ~ 2543 °F)	±1 °C	3.12MΩ
W5	0 ~ 2315 °C (32 ~ 4199 °F)	±1 °C	3.12MΩ
W3	0 ~ 2315 °C (32 ~ 4199 °F)	±1 °C	3.12MΩ
LR	-200 ~ 800 °C (-328 ~ 1472 °F)	±1 °C	3.12MΩ
A1	0 ~ 2500 °C (-32 ~ 4532 °F)	±1 °C	3.12MΩ
A2	0 ~ 1800 °C (-32 ~ 3272 °F)	±1 °C	3.12MΩ
A3	0 ~ 1800 °C (-32 ~ 3272 °F)	±1 °C	3.12MΩ
M	-200 ~ 100 °C (-328 ~ 212 °F)	±1 °C	3.12MΩ
PT50 (α = 0.00385)	-200 ~ 850 °C (-328 ~ 1562 °F)	±0.4 °C	2.0KΩ
PT100	-200 ~ 850 °C	±0.4 °C	2.0KΩ

( $\alpha = 0.00385$ )	(-328 ~ 1562 °F)		
PT200	-200 ~ 850 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00385$ )	(-328 ~ 1562 °F)		
PT500	-200 ~ 850 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00385$ )	(-328 ~ 1562 °F)		
PT1000	-200 ~ 350 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00385$ )	(-328 ~ 662 °F)		
PT50	-200 ~ 850 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00391$ )	(-328 ~ 1562 °F)		
PT100	-200 ~ 850 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00391$ )	(-328 ~ 1562 °F)		
JPT50	-200 ~ 600 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.003916$ )	(-328 ~ 1112 °F)		
JPT100	-200 ~ 600 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.003961$ )	(-328 ~ 1112 °F)		
JPT200	-200 ~ 600 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.003916$ )	(-328 ~ 1112 °F)		
JPT500	-200 ~ 600 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.003916$ )	(-328 ~ 1112 °F)		
JPT1000	-200 ~ 350 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.003916$ )	(-328 ~ 662 °F)		
Ni100	-60 ~ 180 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00617$ )	(-76 ~ 356 °F)		
Ni200	-60 ~ 180 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00617$ )	(-76 ~ 356 °F)		
Ni500	-60 ~ 180 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00617$ )	(-76 ~ 356 °F)		
Ni1000	-60 ~ 180 °C	$\pm 0.4$ °C	2.0K $\Omega$
( $\alpha = 0.00617$ )	(-76 ~ 356 °F)		
+20mA	-26 ~ 26mA	$\pm 0.05\%$	75 $\Omega$
+60mV	-122~122mV	$\pm 0.05\%$	3.12M $\Omega$
+200mV	-243~243mV	$\pm 0.05\%$	3.12M $\Omega$
+1V	-1.58~1.58V	$\pm 0.05\%$	3.12M $\Omega$
+2V	-3.16 ~ 3.16V	$\pm 0.05\%$	3.12M $\Omega$
+6V	-6.32 ~ 6.32V	$\pm 0.05\%$	3.12M $\Omega$
+20V	-25.3 ~ 25.3V	$\pm 0.05\%$	3.12M $\Omega$
+50V	-50.6 ~ 50.6V	$\pm 0.05\%$	3.12M $\Omega$
0.4 ~ 2V	-3.16 ~ 3.16V	$\pm 0.05\%$	3.12M $\Omega$
1~5V	-6.32 ~ 6.32V	$\pm 0.05\%$	3.12M $\Omega$

### Digital Input Card (DI206):

Channels: 6 per card  
 Logic Low: -5V minimum, 0.8V maximum  
 Logic High: 3.5V minimum, 24V maximum  
 External pull-down Resistance: 1K $\Omega$  maximum  
 External pull-up Resistance: 1.5M $\Omega$  minimum

### Relay Output Card (RO206):

Channels: 6 per card  
Contact Form: N.O. & N.C. (form C)  
Relay Rating: 5A/240 VAC, life cycles 200,000 for resistive load

### **Analog Output Card (AO206):**

Channels: 6 per card  
Output signal: 4-20mA, 0-20mA, 0-5V, 1-5V, 0-10V  
Resolution: 16 bits  
Accuracy:  $\pm 0.05\%$  of Span  $\pm 0.0025\%$  /°C  
Load Resistance: 0-500 ohms (current), 10K ohms minimum (voltage)  
Output Regulation: 0.01% for full load change  
Output Setting Time: 0.1 second (stable to 99.9%)  
Isolation Breakdown Voltage: 1500VAC at 50/60Hz for 1 minute  
Integral Linearity Error:  $\pm 0.005\%$  of Span  
Temperature Effect:  $\pm 0.0025\%$  of Span /°C

### **COMM Module (IF232 and IF485):**

Interface: RS-232 (1 unit), RS-485 or RS-422 (up to 247 units)  
Protocol: Modbus Protocol RTU mode  
Address: 1-247  
Baud Rate: 9.6 ~ 115.2 Kbits/sec.  
Measured data Bits: 7 or 8 bits  
Parity Bit: None, Even or Odd  
Stop Bit: 1 or 2 bits

### **Standard Ethernet Communication:**

Protocol: Modbus TCP/IP, 10/100 Base T  
Ports: AUI (Attachment Unit Interface) and RJ-45, Auto- detect capability

#### **Real time clock accuracy vs. temperature inside of housing**

Temperature inside housing	typical error per month
10 ~ 40 °C	18 seconds
0 °C or 50 °C	52 seconds
-10°C or 60 °C	107 seconds

### **Environmental & Physical:**

Operating Temperature: 0 ~ 50 °C  
Storage Temperature: -30 ~ 70 °C  
Humidity: 20 to 90% RH (non-condensing), maximum relative humidity 90% is for ambient temperature up to 38°C decreasing linearly to 50% relative humidity at 50°C  
Altitude: 2000 M maximum

Insulation Resistance: 20 M ohms min. (at 500 VDC)  
Dielectric Strength: 2300VAC, 50/60 Hz for 1 minute between power terminal and earth  
Vibration Resistance: 10-55 Hz, 10m/ s<sup>2</sup> for 2 hours  
Shock Resistance: 30m/ s<sup>2</sup> (3g) for operation, 20g for transportation  
Operation Position: no inclined restriction  
Dimensions: Panel Mount style: 144(W) x 144(H) x 193mm(D) (for PR10/20)  
288(W) x 288(H) x 194mm(D) (for PR30)  
Standard Panel Cutout: 137 x 137mm (for PR10/20)  
281 x 281mm (for PR30)

### **Approval Standards:**

Safety: UL61010C-1, CSA C22.2 No. 24-93  
CE: EN61010-1 (IEC1010-1) over voltage category II, Pollution degree 2

Protective Class: IP 65 front panel for indoor use,  
IP 20 housing and terminals

EMC:

Emission: EN61326-1 (EN55022 class A, EN61000-3-2, EN61000-3-3)

Immunity: EN61326-1 (EN61000-4-2, EN61000-4-3, EN61000-4-4,  
EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11)

## **5. Installation and wiring**

### **5.1 Unpacking**

If any damage is found while unpacking, the user should contact the local representative at once. It is suggested that the special packaging is retained for possible future requirement.

### **5.2 Installation**



**Remove stains from this equipment using a soft, dry cloth. Don't use harsh chemicals, volatile solvent such as thinner or strong detergents to clean the equipment in order to avoid deformation.**

The recorder is designed for indoor use and not in any hazardous area. It should be kept away from shock, vibration, and electromagnetic fields such as variable frequency drives, motors and transformers.

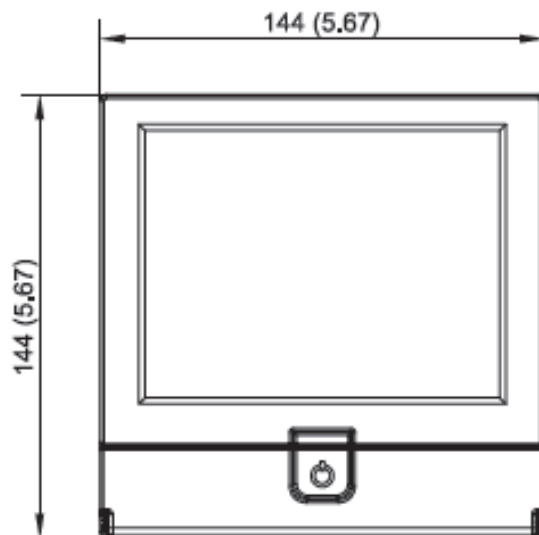
It is intended to operate under the following environment:

Pollution Degree Level II	IEC1010-1(EN61010-1)
Temperature	0 ~ 50 °C
Humidity	20 ~ 90 % RH (non-condensing)
Power	90 ~ 250 VAC, 50/60 Hz or 11-36VDC
Altitude	2000M maximum

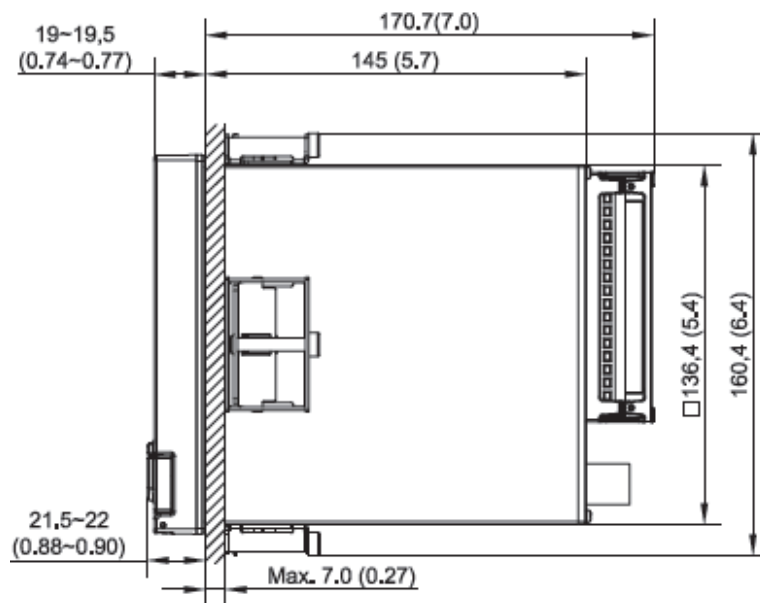
### 5.3 Panel mounting style

#### PPR 500:

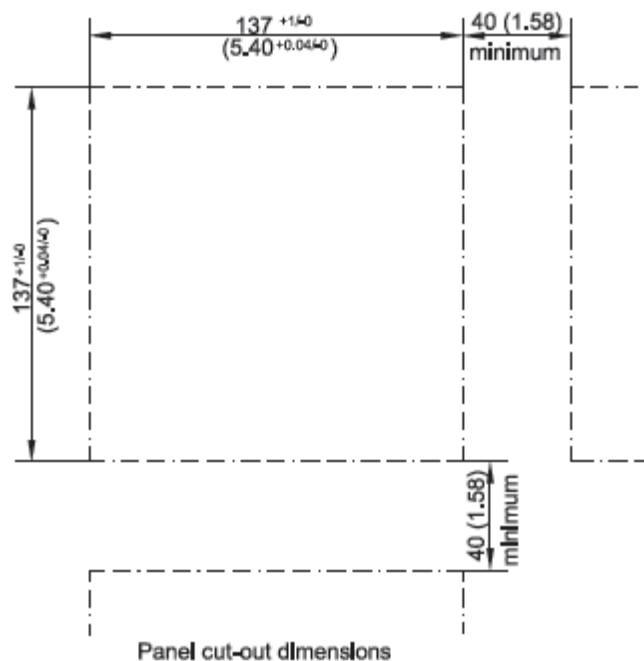
Front Side



Right Side



### Panel Cut Out Dimensions

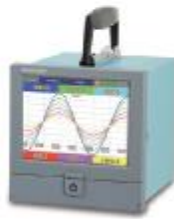


**Note:**



- ◆ Do not over tighten mounting clamp screws that could result in distortion of the case.
- ◆ There is no mounting angle restriction.

**Portable styles:**



## 5.4 Setup input and output

### Analog input cards (part numbers AI206 and AI203)

**AI 206 and AI 203** are analog input cards in 3 and 6 channels respectively. Each card includes universal input of TC ( J, K, T, E, B, R, S, N, L,U,P,W5,W3,LR,A1,A2,A3,M ), RTD, mV, mA, V. The accepted input types and sensor range for each type are listed on the clause 1.8 of chapter 1. To plug the card into the rear slot then power on. The recorder will automatically detect the card and display the specific input type, then show its source of a specific slot in Configuration Mode.

To select a specific input, please press menu and then Config button to get into the configuration window. In the configuration window, press up/down and enter key to select AI and get into AI setting window. In the AI setting window, move the selected focus to the item "Type" under the node "Sensor" and then press enter key to select the desired sensor type. Press OK when finished. It's similar to set up for all the other items. The item "Events" can be added to do further control.



Figure 2 – 15 (AI206)

## Relay Output card (RO206) / 6 relay alarm card

The relay output card includes 6 relays rated 5 Amp/240 VAC. Plug the card into rear slot and power on. The recorder will automatically detect the card and then display the output type and its source of a specific slot in **System Info** mode whilst doing the configuration.

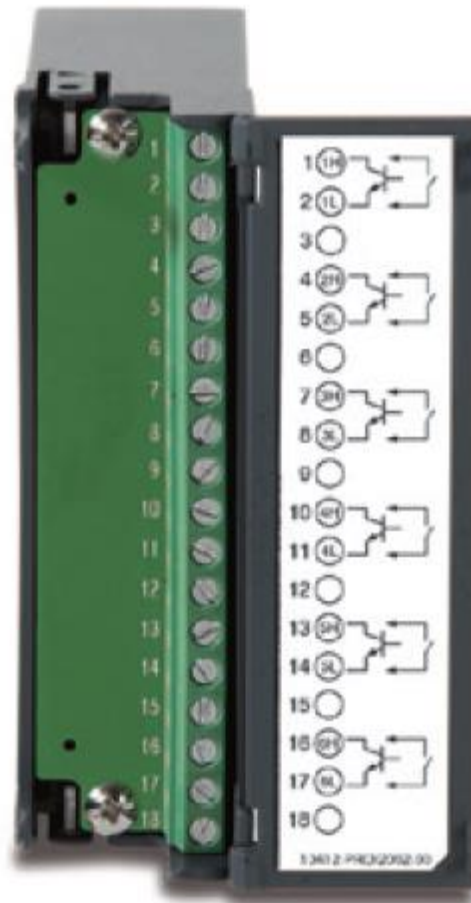
To set up the relay output card, please press menu and then Config button to get into the configuration window. In the configuration window, press up/down and enter key to select RO and get into RO setting window. In the RO setting window, the setup steps are similar to AI. The item "Reverse" is to reverse the output status.



## Digital Input card (DI206)

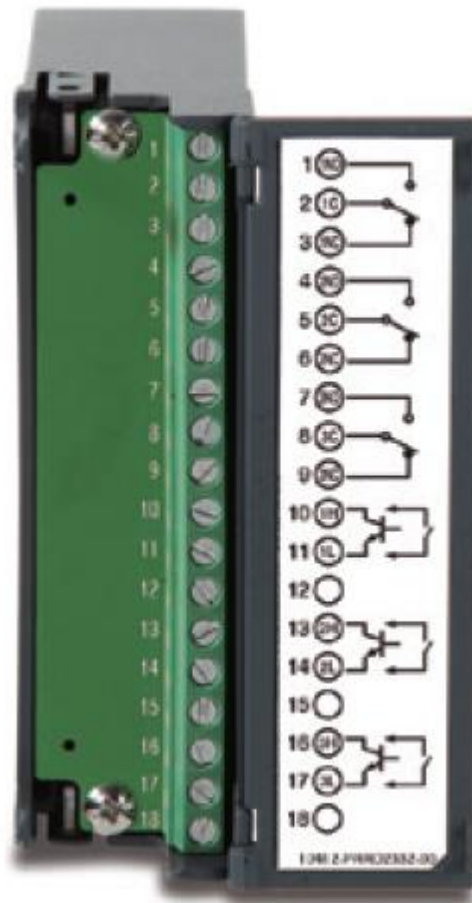
This card includes 6 channels of event 1, 2, 3, 4, 5 & 6. As above, plug the card into rear slot and power on. The recorder will automatically detect it, and then display the input type and its source of a specific slot in System Info mode whilst doing the configuration.

To set up the digital input card, please press menu and then Config button to get into the configuration window. In the configuration window, press up/down and enter key to select DI and get into DI setting window. In the DI setting window, the setup steps are similar to AI. The item "Type" is to decide for this channel to input logic level or Pulse Counter. If you select Pulse Counter, the item "Frequency" will appear for you to select input frequency (100Hz, 1KHz or 10KHz). The item "Events" can be added to do further control.



## Combination Digital Input and Output card (RD233)

This card includes 3 relays rated 5 Amp/240 VAC and 3 Channels of Digital Inputs. As above, plug the card into rear slot and power on. The recorder will automatically detect it, and then display the input type and also Relay. The first 3 combination are for relays (Terminal 1 to 9) and last 3 combination are for Digital inputs (Terminals 10 to 18). The setup is similar to relay output card and digital input card.



## Analog output cards (AO206)

This card are 6-channel current output card. They are used to retransmit process value to another device.

To set up the analog output card, please press menu and then Config button to get into the configuration window. In the configuration window, press up/down and enter key to select AO and get into AO setting window. In the AO setting window, the setup steps are similar to AI. The item "Type" is to decide to output current or voltage. The item "Output" is to select the output range for current or voltage. The item "Expression" is a math expression field and can be inputted to control the output value.

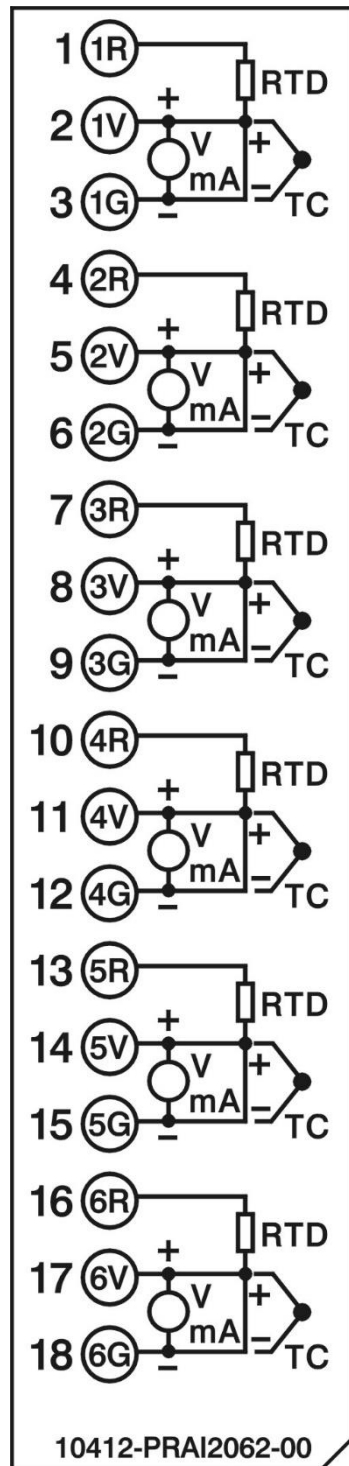


**Note: The IO Cards should not be removed or Inserted to the PR when the Power is ON. This should be carried out at Power OFF Condition only.**

## 5.5 Wiring of the cards

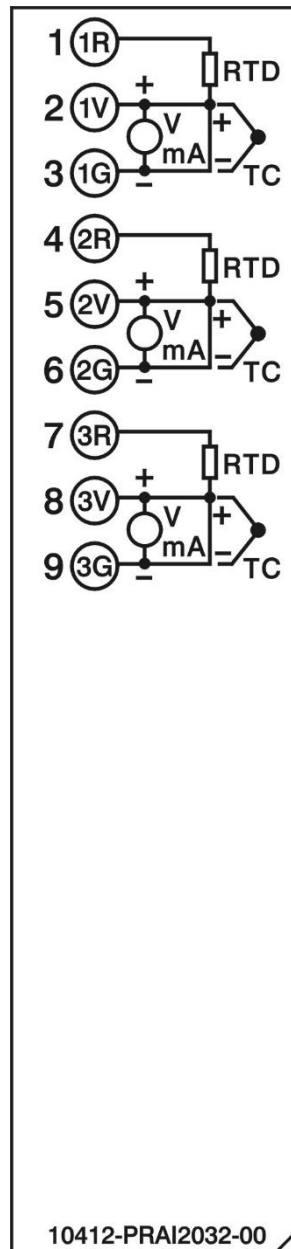
### **Wiring Precautions**

1. Care must be taken to ensure that maximum voltage rating specified on the label is not exceeded.
2. For the panel-mount version, it is recommended that near the equipment an external fuse and an external switch rated at 2A/250 VAC should be equipped.
3. Beware not to over tighten the terminals screws. The torque should not exceed 0.4 N-m ( 3.6 Lb-in or 4.0 Kg F-cm ).
4. Except the thermocouple wirings, all wirings should be stranded copper conductor with maximum gauge 18 AWG.
5. Connect a grounding conductor with 1.6mm diameter minimum to provide protective grounding prior to turning on the equipment.

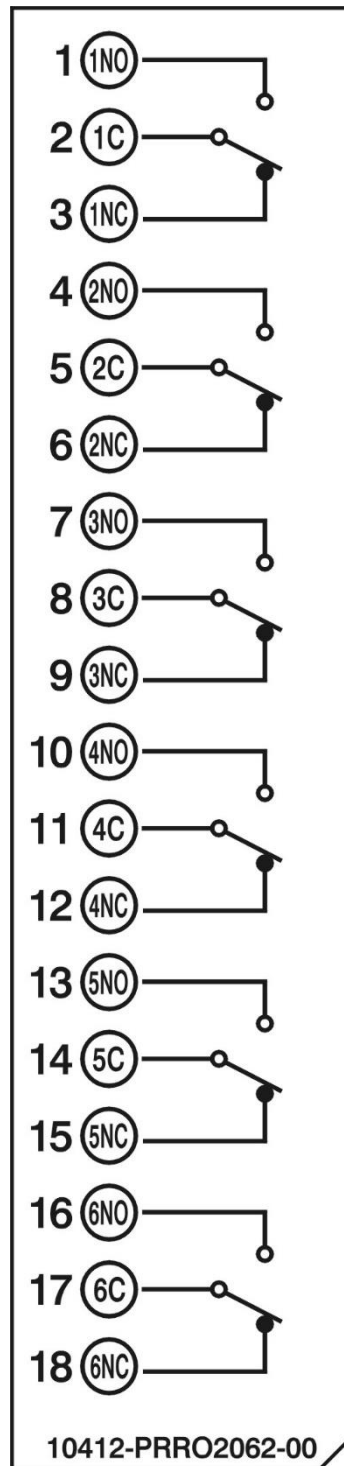


Analog Input Card AI206

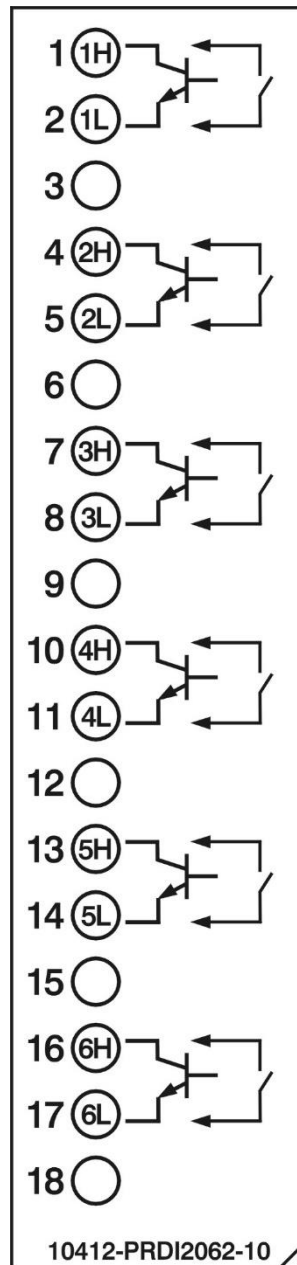




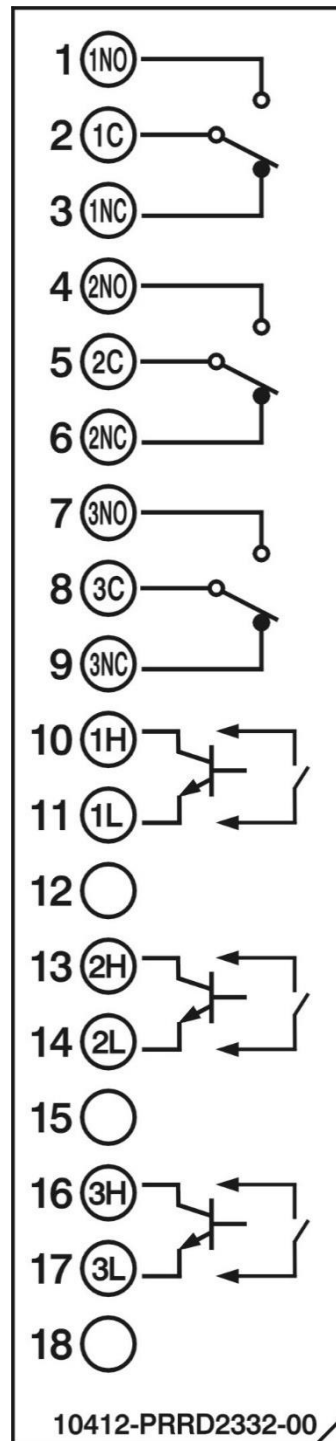
Analog Input Card AI203



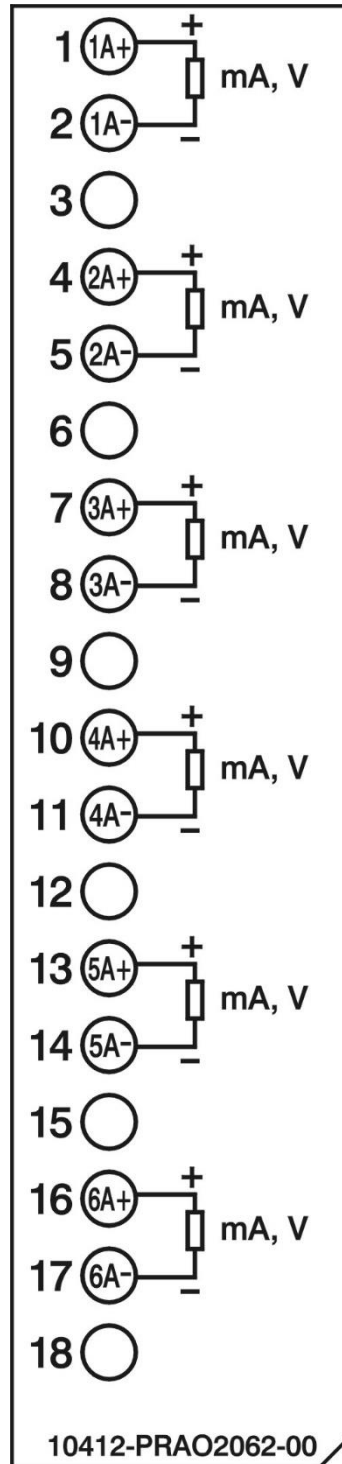
**Relay output card (RO206)**



Digital input card (DI206)



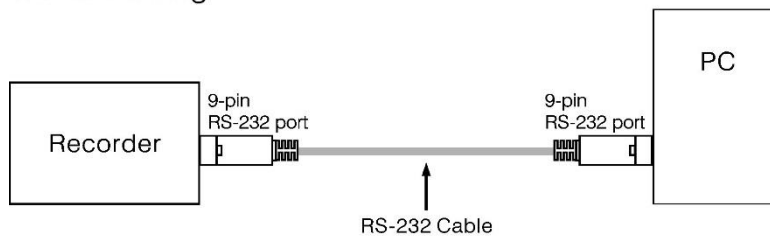
Relay output and digital input card (RD233)



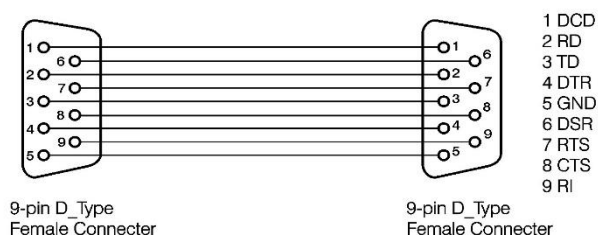
**Analog output card (AO206)**

## 5.6 RS-232, RS-422, RS-485 wiring

### RS-232 Wiring

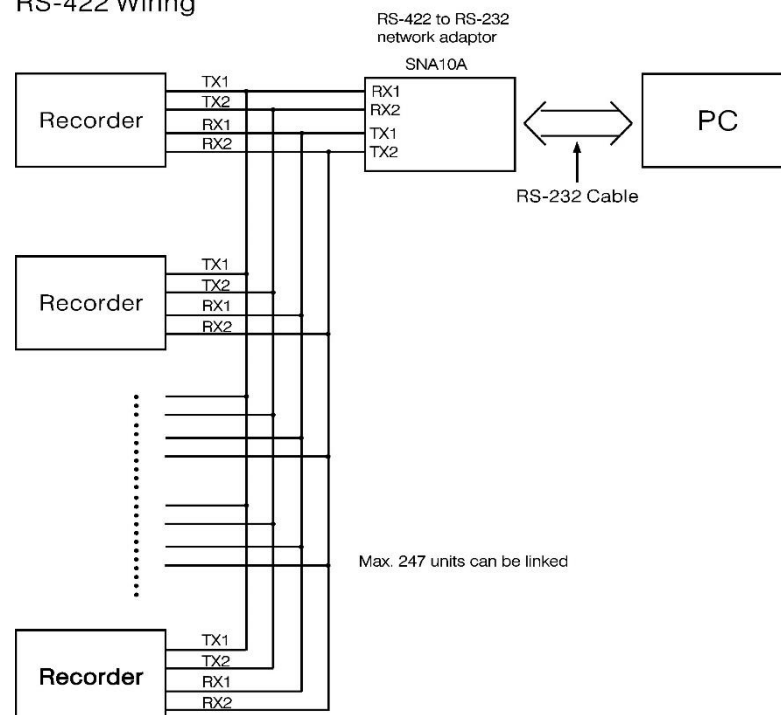


### Configuration of The RS-232 Cable

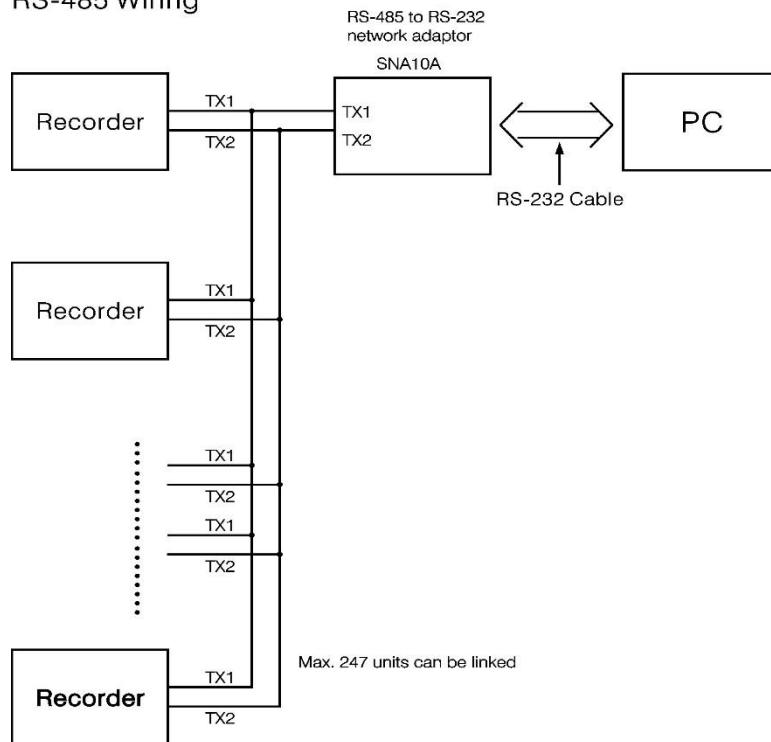


**Figure 2 – 24**

### RS-422 Wiring

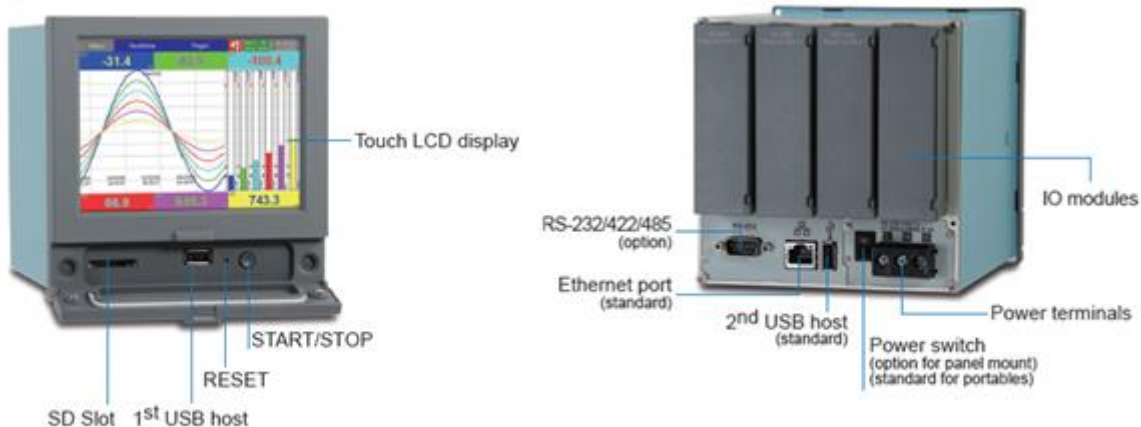


## RS-485 Wiring



## 5.7 External Memory Card:

There are two types of external storage for the User. One is the SD card and the other is USB pen Flash Card. We have got two slots for inserting USB flash, one in the front and the other in the rear side. If a bigger capacity USB pen flash memory is required, and the user may decide to buy it locally. SD card slot is in the front side. Please check the below figures for more information.



## Note:

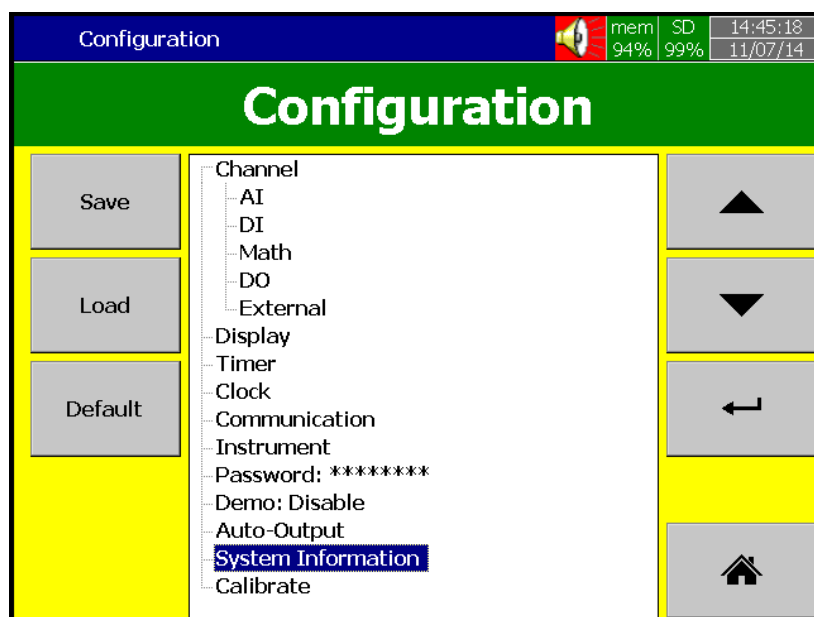
- ◆ To read measured data and events on USB flash memory and SD card Memory, it is necessary to install software free basic software or Extensive Data Acquisition software on PC first.
- ◆ The power should be turned off while inserting input and output cards. It is not recommended to insert input or output cards while the unit is switched on.

## 6. Basic functions of recorders

In this chapter we will be explaining briefly about the functions that are available in the recorder.

### 6.1 Configuration

The configuration in the recorder is following a tree type layout, which is easy for operation for the users to go the different sub menus easily and not miss any setting.

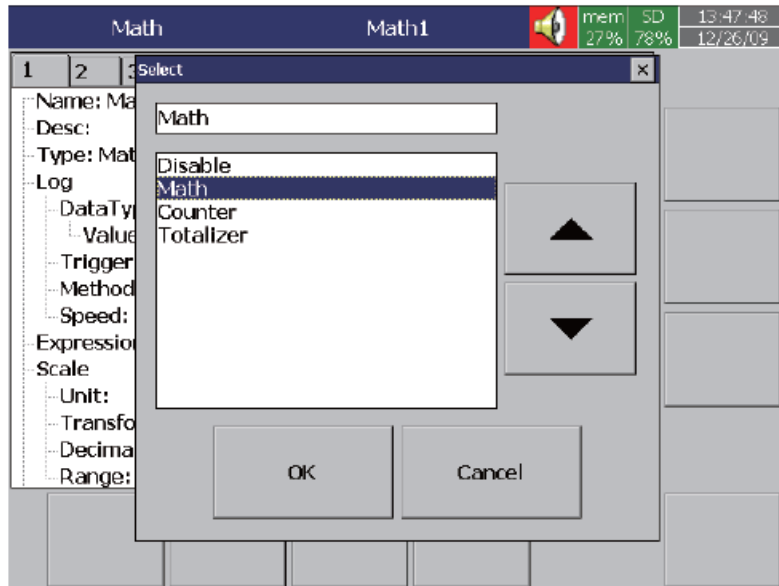




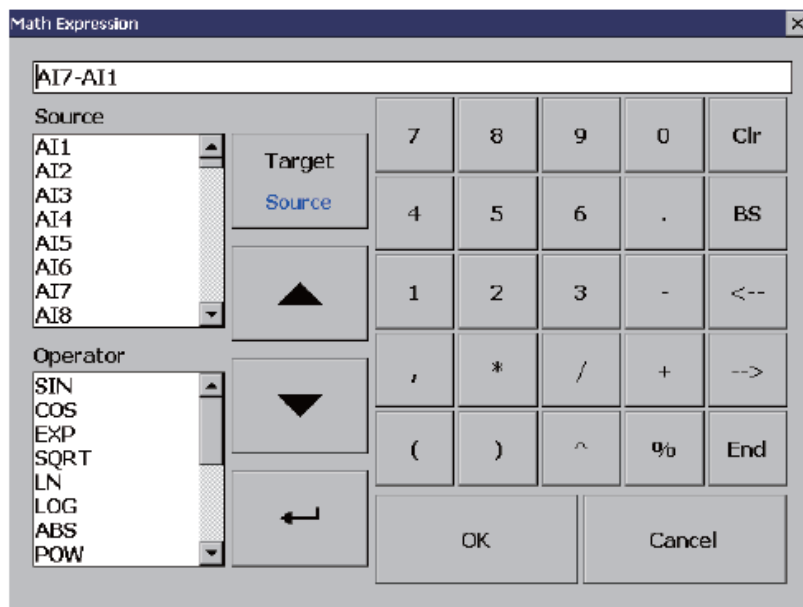
## 6.2 Standard and Plus Version of Firmware

The standard version of firmware will be having only Input configuration and does not include Math, External channels, Custom Edited Display, Batch and FDA CFR part11 functions. While the plus version included all the above.

**Math:** It includes Math, Counter & Totalizer.



Math Expression is keyed in an easy way.



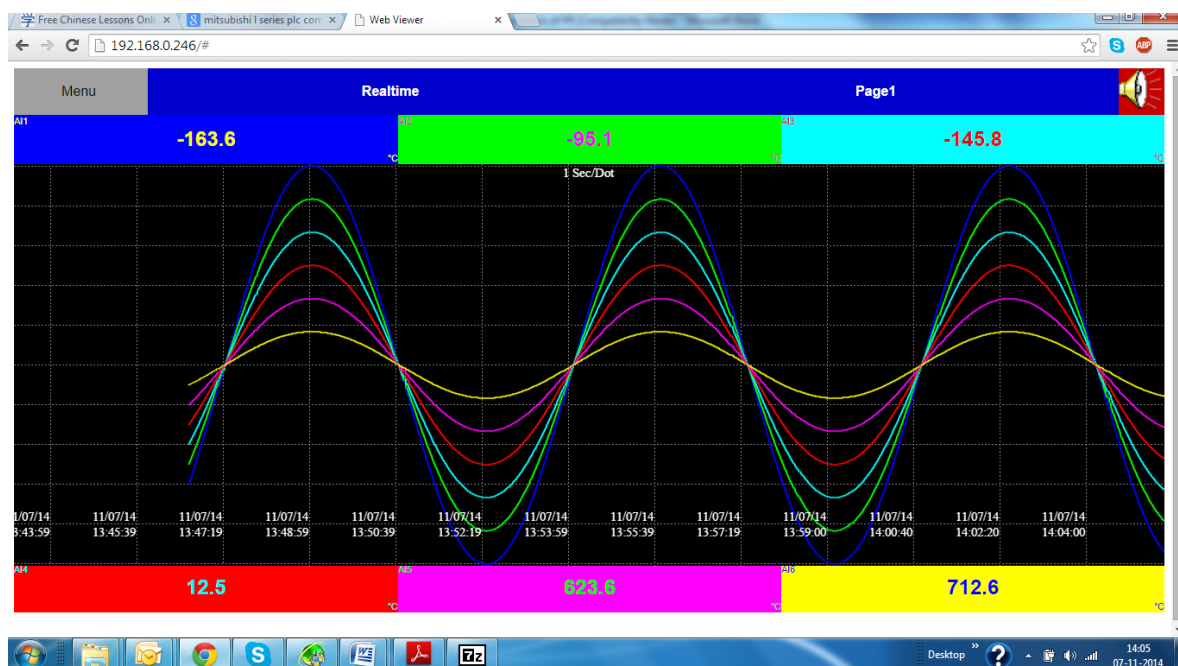
### 6.3 Communication with Third Party Interfaces

The flexibility that Recorder can communicate with Third party Interfaces on Protocols Modbus TCP/IP or Serial as a Master or Slave.

### 6.4 Information Accessibility through WEB

Web Server:

The Recorder Trend and Digital data can be viewed in any place of world as we have got Web Server connectivity. For this the Recorder should be connected to Internet with a fixed IP provided by Internet Service provider.



Email:

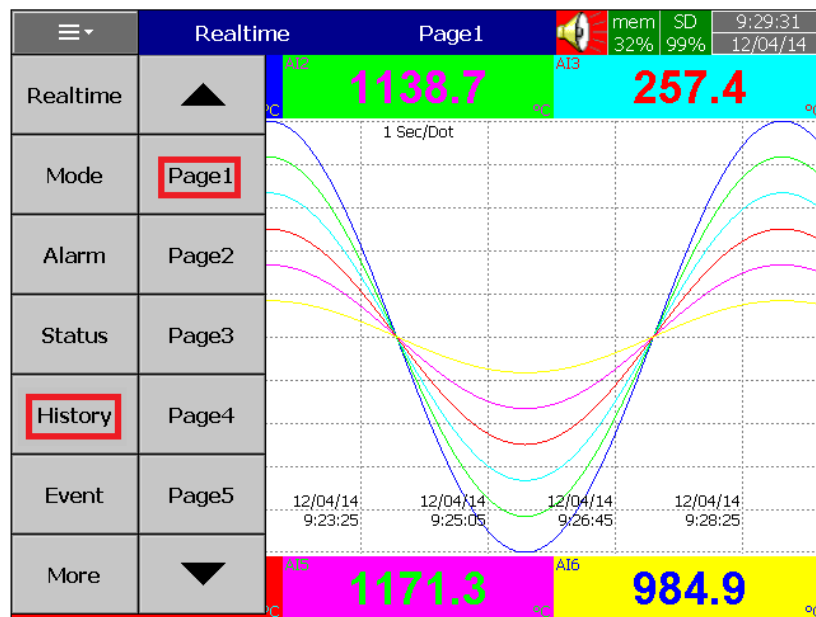
All Important Data events can sent as an email to the concerned personnel. The detailed settings related information can be found in Chapter 4, Configuration, Section 4.5.

## 6.5 Handwriting Messages on Trend Screens

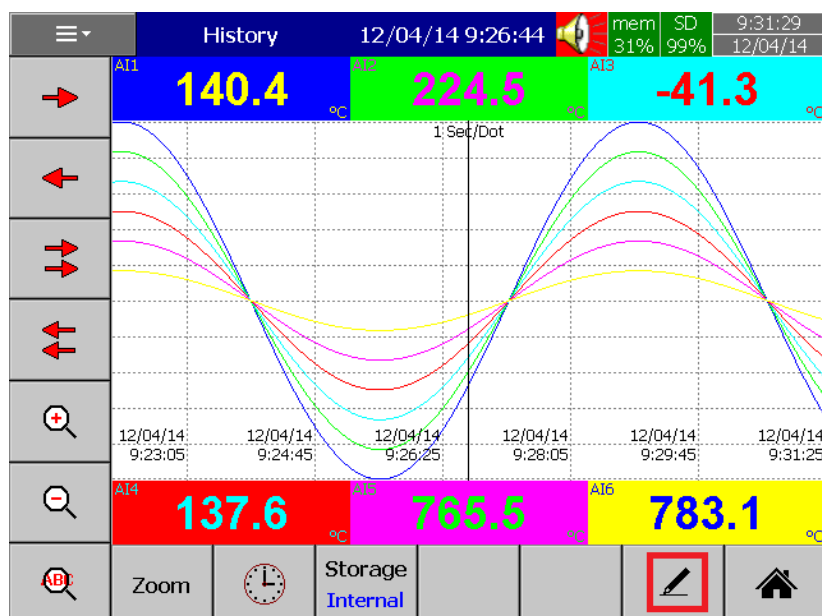
Handwriting Messages on Trend Screens are very handy for process associates to highlight the important events.

The User can write Handwritten messages using stylus on Historical Trend Screens. This is shown in the below picture.

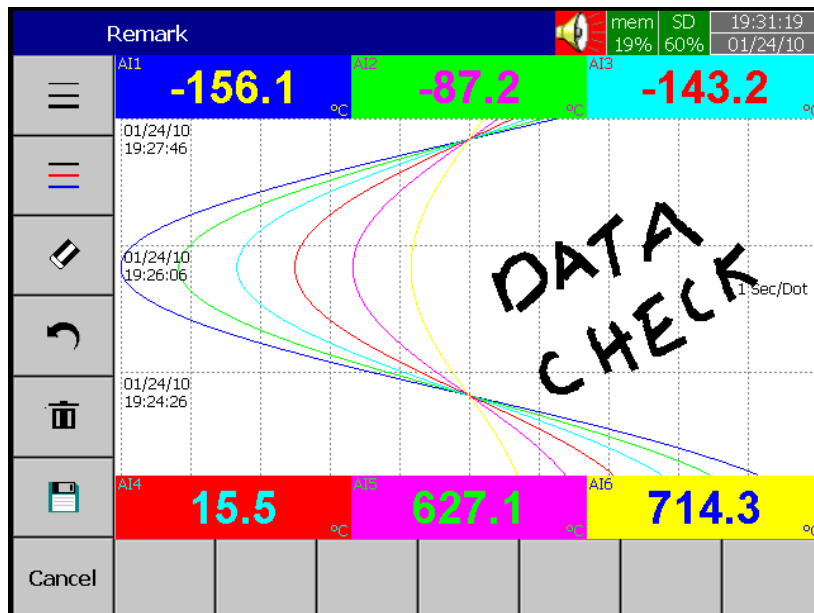
When the User navigates through  (Menu) → History → Page 1, as shown in the below screen.



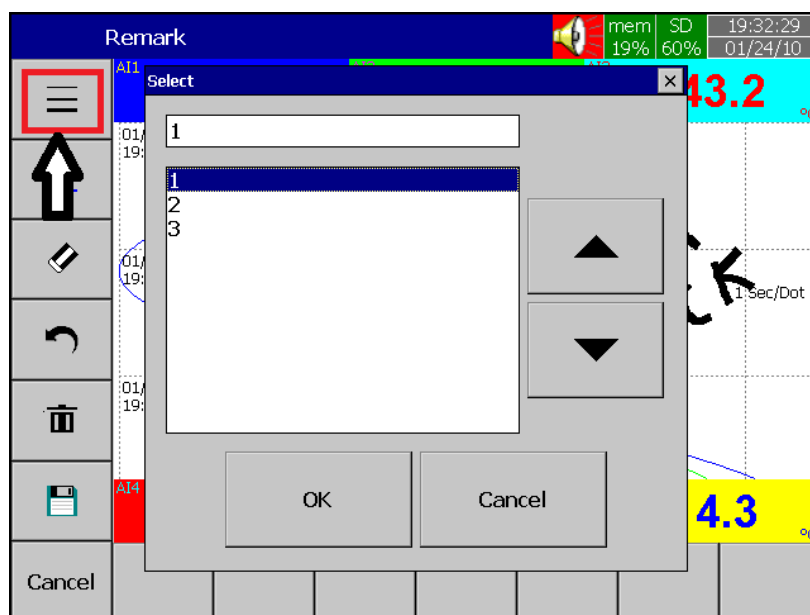
The User wants to write any message then press the pen symbol as shown squared in the below screen



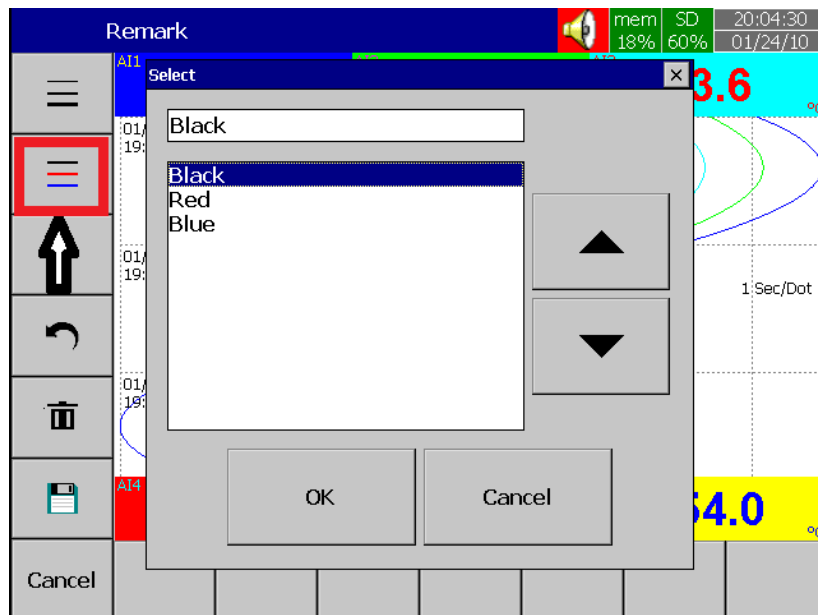
The User using the stylus can write any message as shown in the below screen in Historical Trend Pages.



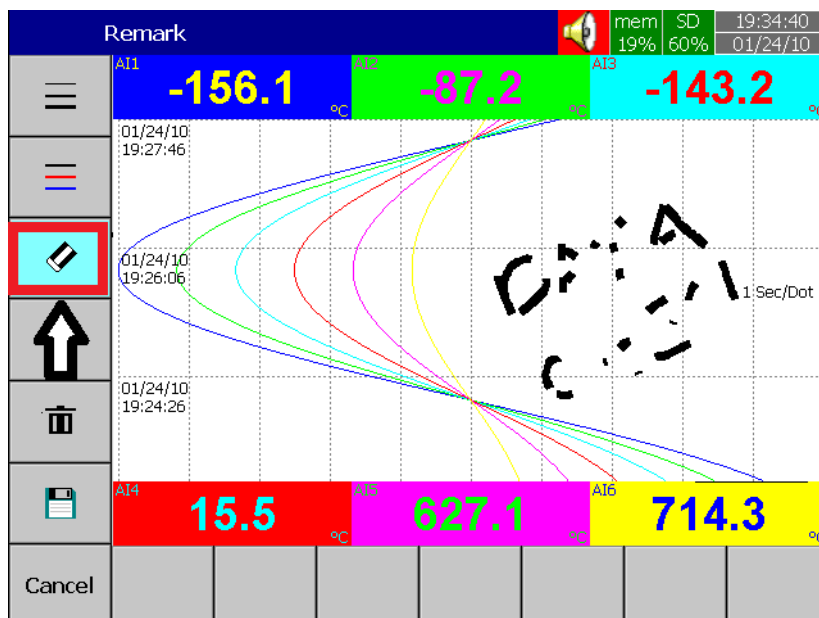
If the User wants to change the width of the written message he/she can choose the width of pen. This can be shown in the below screen. The menu to change the width is shown by the arrow



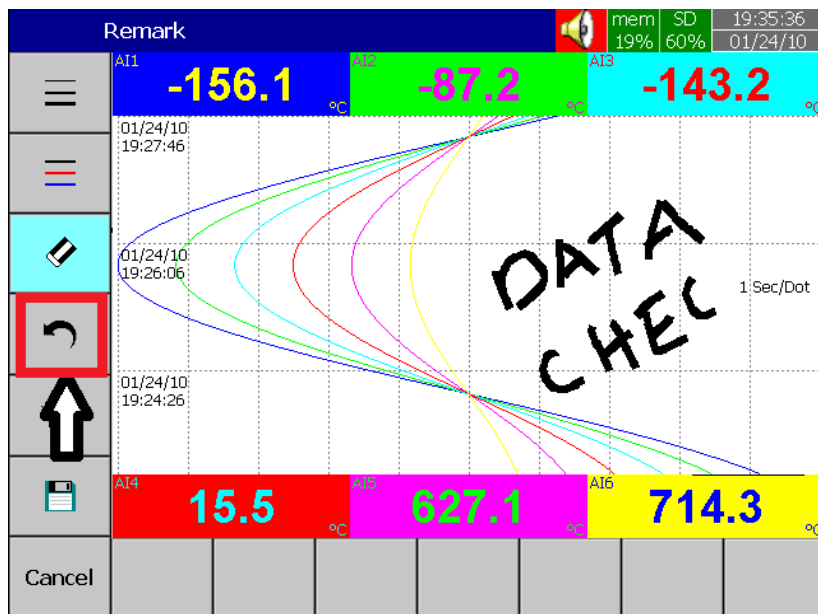
If the User wants to change color of the pen. He/she can change by pressing the menu, this can be shown in the below screen (the arrow points the menu)



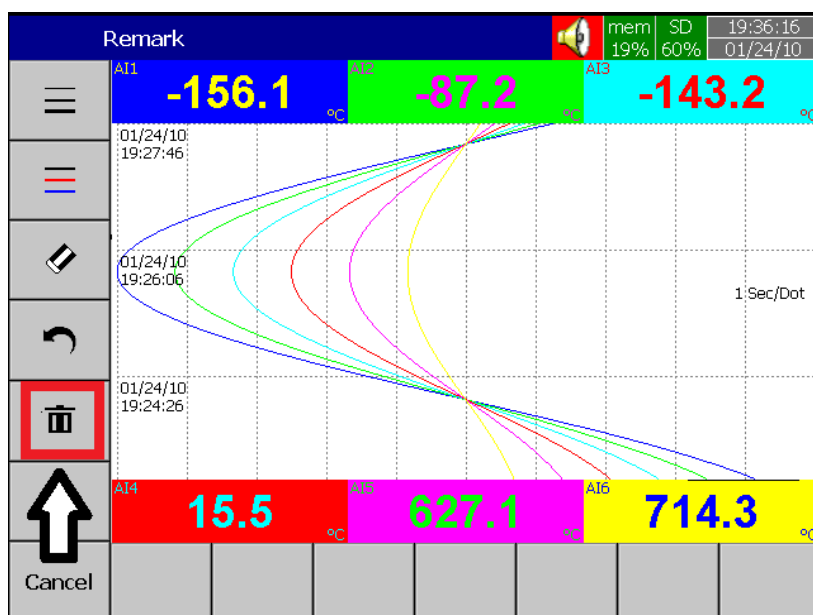
If the User wants to erase a part of message. He/she can do by pressing the menu (shown in arrow), and erase part of the message. This is shown in below screen.



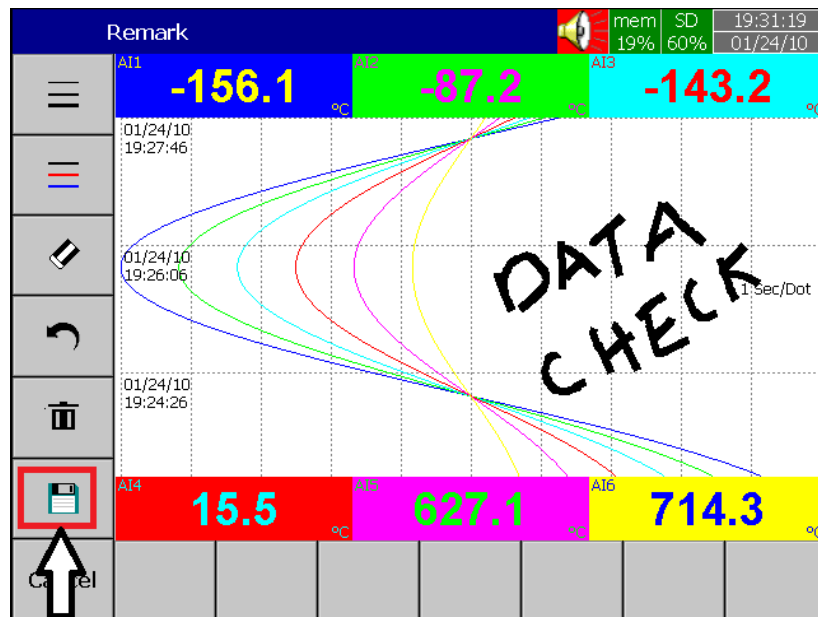
If the User wants to undo a part of message. He/she can do by pressing the menu (shown in arrow), and will undo the part of the message. This is shown in below screen.



If the User wants to delete the written message. He/she can do by pressing the menu (shown in arrow), and this will delete the written message. The same is shown in below screen.



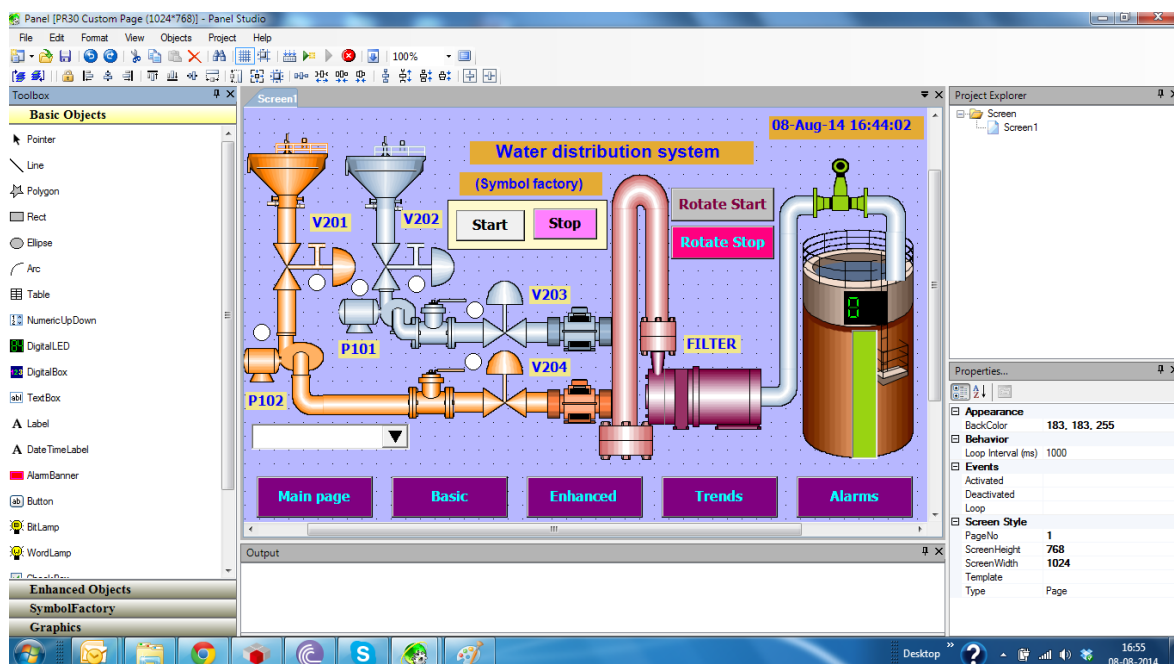
If the User wants to save the written message. He/she can do by pressing the menu (shown in arrow below), and this will save the written message. The same is shown in below screen.



## 6.6 Custom Edited Display Screens

(We call it Custom Page on device and Custom Page Editor on pc software)

In Plus versions, The PC software Panel Studio allows users to have custom edited displays linked with Analog and Digital Tags. We call it Custom Page on device and Custom Page Editor on pc software.



## **6.7 Analog Input Log Speed Flexibility**

The Analog input can be logged at various speeds such as 100ms, 1,2,5,10,20,50 sec/Dot and 1,2 Min/Dot. So the User has got lot of flexibility in logging speeds.

## **6.8 High Speed Input**

The Digital input can be accessed as normal Logic or a High frequency pulse.

## **6.9 System Clock Synchronization via Internet**

The Recorder System clock can be synchronized via internet and Summer Saving Time can be defined. The detailed settings related information can be found in Chapter 7, Configuration, Section 7.4.

## **6.10 Increased Security in Password configuration**

The password can be configured as normal and CFR-21. For normal there is only one password defined but for CFR-21 three 9 levels of password definition. The related settings information can be found in Chapter 7, Configuration, Section 7.7.

## **6.11 Auto Output to Printer**

The daily or shift reports data can be printed automatically by the Printer. The related settings information can be found in Chapter 7, Configuration, Section 7.9.

## **6.12 External Channels**

Besides AI and DI inputs the Recorders can accept inputs through communication (MODBUS). PPR 500 can work External Channels maximum up to 24, 48 and 96 respectively. The related settings information can be found in Chapter 7, Configuration, Section 7.1.6.

## **6.13 Batch**


Using this function, the recorded data can be stored in batches as per shift. So that it will be easy for the production personnel for quality and quantity management.

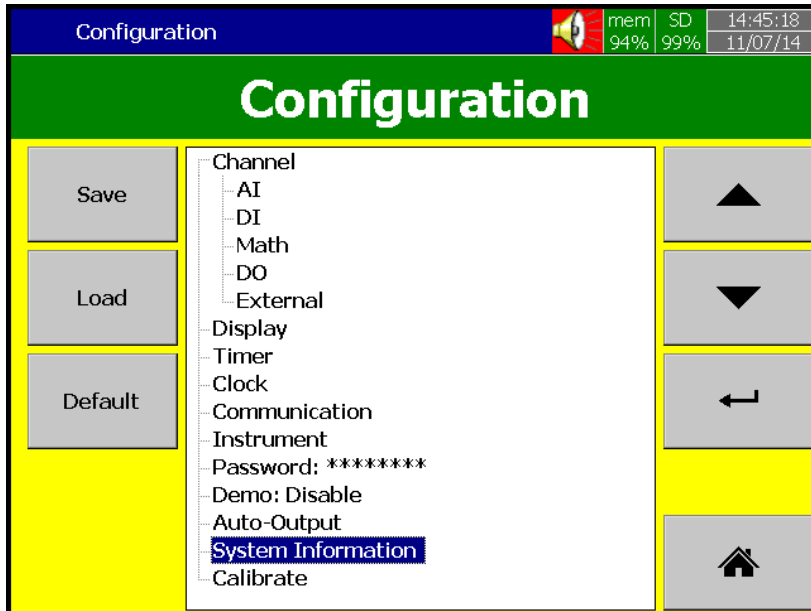
## **6.14 FDA 21 CFR PART 11**

This feature is compiled with U.S. Food and Drug Administration with human health concern. When this feature is enabled the recorded data cannot be manipulated.



## 7. Configuration

Press  ("Menu"), then, "More" soft button to enter the Config (Configuration mode). A vertical list appears with a provision to configure Channel, Tools, Message, Display, Instrument, Security, Auto-Output, Demo and system Information. Meanwhile, the following soft buttons also appear Save, Load, Default and Home.



### Soft buttons



Enter key



Up directional key



Down directional key



Home key

Various options available to enter into configuration mode

Option-1: Select the mode by pressing up & down directional keys, then press "Enter" key

Option-2: Select the required mode directly with a touch, then press "Enter" key

Option-3: Select the required mode and then press two times quickly using Touch, it is same as double click from mouse

**Save:** Save configuration from recorder to USB Stick or SD Card. **To read the configuration from USB Stick for the first time or any time configuration has**


**been changed, it is important to press “Save” soft button to save configuration changes to USB Stick or SD Card beforehand.**

**Load:** Load configuration from storage media USB stick **or SD Card** to recorder.

**Default:** If the configuration is set incorrectly, Default is a useful key to recall the default settings on the analog input card inserted into rear expansion slot.

**Home:** Go to home page.

## 7.1 Channel

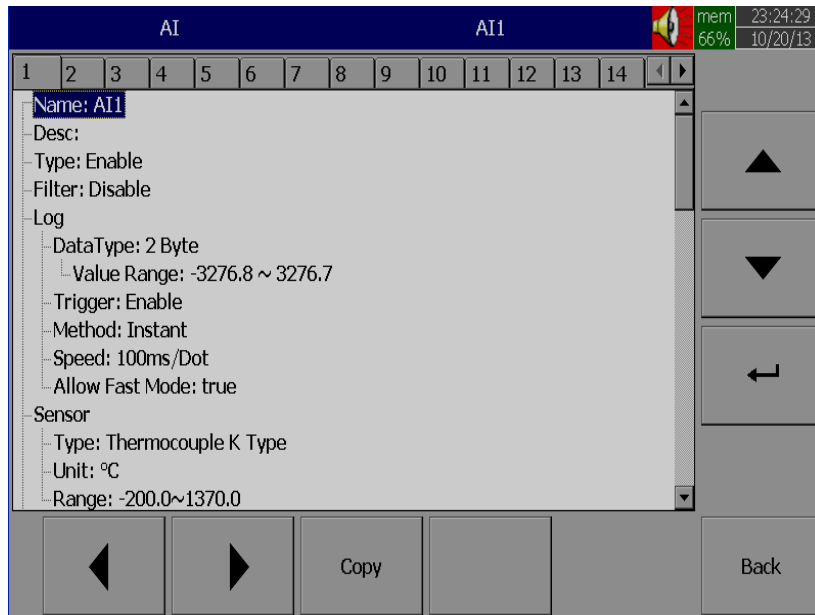
Path:  (Menu)-More-Config-Channel

AI  
DI  
Math  
AO  
DO  
External

This section is to configure different type of channels. Analog Input (AI), Digital Input (DI), Math, Analog Output (AO), Digital Output and External device channels.

### 7.1.1 Analog Input

After entering the Configuration mode, in Channel, select “**AI**” then Press the “**Enter**” key to get into Analog Input Channel mode. It displays the Analog input **AI1**, first analog input channel configuration page. Press directional keys < > at the bottom to select other channels. Press directional keys ↑ ↓ on the right hand side to select the column. **After completing Configuration, press “Back” soft button, then press “Home” soft button to return to main display, then, all configurations will be memorized.**



**Copy:** Copy the channel configuration say from channel1 to channel2 etc.. Select the source channel, say Channel1, press on “Copy” button, now “Paste” button will get enabled, go to target channel say channel2 and then press on “Paste” button.

**Name:** It is to define the name for each channel in maximum 18 characters.

Select “Name”, then Press “**Enter**”, soft button, a keyboard with several keys appear. Press on “**Shift**” to select special characters. Press on “**Caps**” to select Capital letters. Press soft key “**OK**” after entering channel name.

**Desc:** The description about a specific channel on the display.

**Type:** Option available to enable or disable the channel from selection

**Filter:** It is to reduce the noise of input signal before sampling. It is possible to select range from 1 to 16 sec. It is a soft filter available to reduce fast variation of analog inputs. It gives a moving average value. For ex: If filter value is set as 5 sec for AI1, it means, all the samples collected in the last 5 sec shall be averaged and value is available to record as per Log method.

**Log:**

**Data Type:** 2 byte

2 byte range: -32767 to +32767

**Trigger:** Two options are available

- a) Disable: Select disable while the recording of a specific channel is not required at this time
- b) Enable: Select Enable while the recording of a specific channel is required at this time

**Method:** This is method of logging measured data. Select the column and press enter 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

**Speed:** It is the logging speed (recording speed) of measured data. Select Log Speed column, then choose one of the following

100ms/Dot

1 Sec/Dot

2 Sec/Dot

5 Sec/Dot

10 Sec/Dot

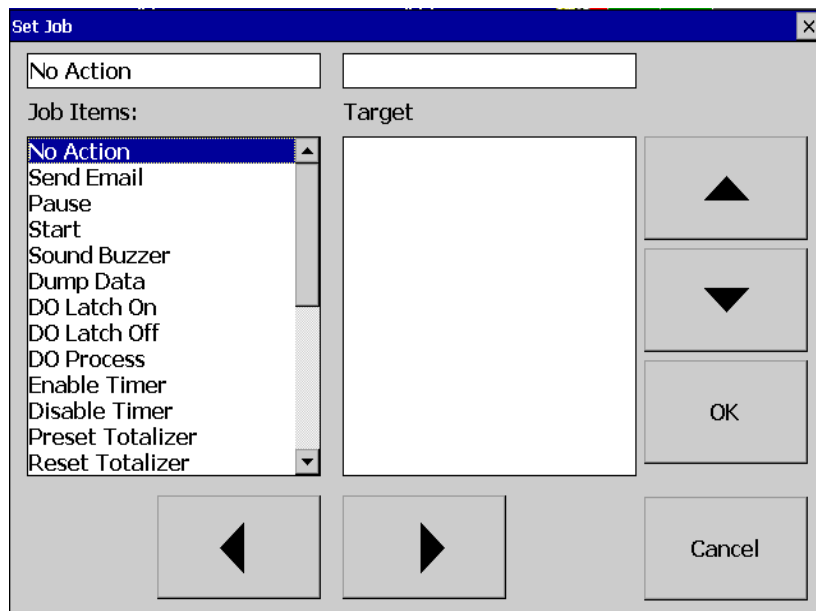
20 Sec/Dot

30 Sec/Dot

1 Min/Dot

2 Min/Dot

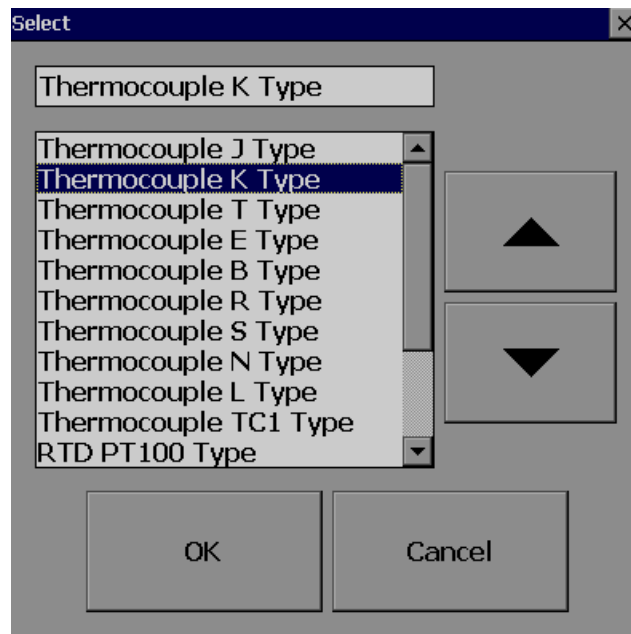
(Auto)Set Jobs under Events



## Sensor

- Type: Thermocouple K Type, °C
- Unit: °C
- Range: -200.0~1370.0

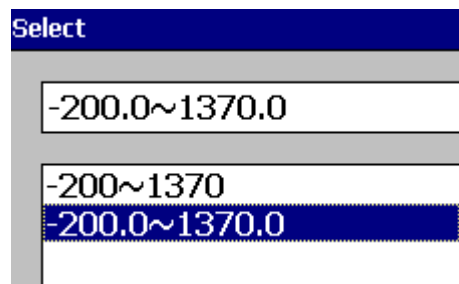
**Type:** Select the sensor input type for the Channel.



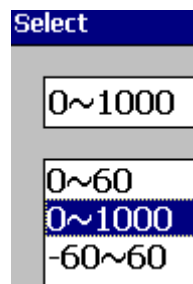
RTD JPT100 Type  
RTD RTD1 Type  
Milli-Volts  
Volts  
Current

**Unit:** The engineering unit of input.

**Range:** Select based on Sensor type



- Sensor
- Type: Milli-Volts
- Unit: mV
- Range: 0~1000



Sensor  
 Type: Volts  
 Unit: V  
 Range: 0~5

Select  
 0~5  
 0~10  
 0~5  
 1~5  
 -2~2  
 -20~20

Sensor  
 Type: Current  
 Unit: mA  
 Range: 4~20

Select  
 4~20  
 0~20  
 4~20  
 -20~20

**Scale:** Appears only for linear input Ex: mV, Voltage, current etc..

Scale  
 Unit: °C  
 Low: -120.0  
 High: 1000.0

**Offset:** It is offset value to correct the sensor error.

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

## Events

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

Maximum five events are possible to set for each Analog Input

Press "Add" to add new event

Press "Remove" to remove selected event

## Events

Add

Remove

1

Type: H

SetPoint: 776.0

Log: Log Alarm

Job1: No Action

Job2: No Action

Hysteresis: 0.0

Type: There are various types of H, L, HH, LL, Dev+, Dev-, Error to be selected for job or Alarm purpose

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

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

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

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

**Dev+:** Trigger event on positive deviation of process value. The job or alarm is activated when process value is deviated by greater than (set point) earlier process value.

For ex: Set point, Type: Dev +, Value: 10

At 10.00.01 Hrs, Tag1=40

At 10.00.02 Hrs, Tag1 = 51

Then, job or alarm is activated

**Dev-:** Trigger event on negative deviation of process value .The job or alarm is activated when process value is deviated by less than (set point) earlier process value.

For ex: Set point, Type: Dev -, Value: 10

At 10.00.01 Hrs, Tag1=40

At 10.00.02 Hrs, Tag1 = 29

Then, job or alarm is activated.

**Error:** On channel error, an alarm or job is activated

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

## Alarm

**Log Alarm:** Record alarms

**Log Alarm (Auto Ack):** Record alarms and acknowledge automatically

**Log Event:** Record events

**Job1, Job2:** When an event occurs, the task to be performed is called the job. A typical example is to trigger **an alarm buzzer** in event of high temperature. Each pen can accept five different type of events (or alarms) and each event can create two jobs. Please note that a job under Event is different from a job by pressing the **Operate** key. The former is actuated by an event, and the latter is actuated by manual control, no event necessary.

**Note:** Please refer section Jobs for full details about various jobs available

**Hysteresis:** To avoid it been activated too often, the Log Alarm or relay can set for no reaction. Hysteresis value can be defined for the event trigger set point

## Example1

If temperature is increased to more than 120 °C, log alarm and switch on digital output1. When temperature is decreased to less than 80 °C, log the alarm and switch off the digital output1.

Setting of events for the analog input in the channel configuration is as follows..

### Events

Add

Remove

1

Type: H

SetPoint: 120.0

Log: Log Alarm

Job1: DO Latch On\_DO1

Job2: No Action

Hysteresis: 0.0

2

Type: L

SetPoint: 80.0

Log: Log Alarm

Job1: DO Latch Off\_DO1

Job2: No Action

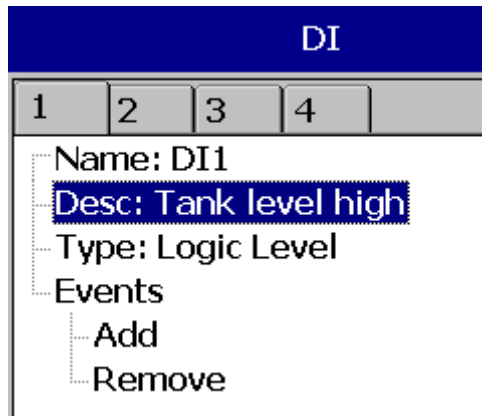
Hysteresis: 0.0



## 7.1.2 Digital Input

Path:  (Menu)-Config-DI

After entering the Configuration mode, in the Channel, select DI then Press the “**Enter**” soft button to get into Digital Input Channel configuration page.



**Name:** Define the name for the Digital Input Channel. Max 18 characters allowed for the name.

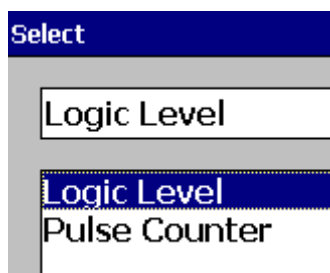
**Description:** Define detail description for the channel.

**Type:** Logic Level

Logic Level: This selection activates digital logic, which is either one or zero with low frequency which is less than 1Hz.

Pulse Counter: On This selection , we can feed high speed inputs ( high Frequency , up to 100Hz)

Select Logic Level and press “Enter” key



**Events:** Maximum 2 events are supported for every digital Input channel. Maximum two jobs can be configured for each event.

Note: Events will not appear if Logic Level selected as Pulse Counter

**Add:** Press “Add” to add events to the Digital Input

**Remove:** Press “Remove” to remove events from the Digital Input

**Type:** Select Low, L or High, H

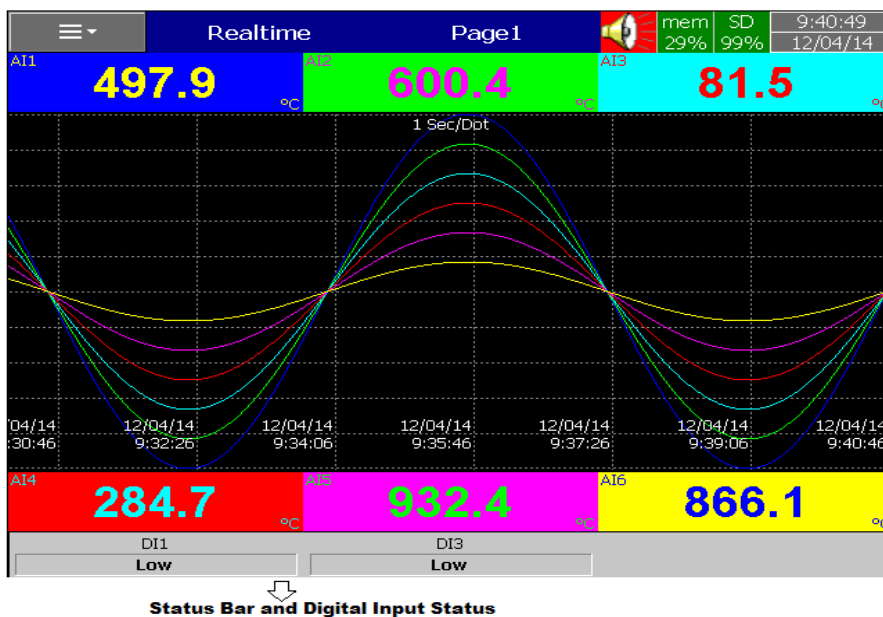
**Job1, Job2:** To configure Job, select Job1, Press on Enter button. It will show list of all the jobs, select the required Job.


Note: Number of digital inputs shown at DI screen depends on number of Digital input cards inserted in the paperless recorder.


Sample applications of Digital input ...

After pressing a “Start” switch at site, latch ON Digital Output1  
 After pressing a “Pause” switch at site, latch Off Digital Output1  
 Start Timer, Stop Timer  
 Reset Totalizer, Reset Counter  
 Reset MaxMinAve values of all the channels etc..

It is possible to display Digital input status via status bar on any page in the paperless recorder. If digital input is not available, it shows as “Low”, Presence of digital input shall be shown as “High”. To configure status bar, refer section “**Display**”




Digital Input status can also monitored from the  (Menu). Press on Status and then select “DI”, it will show Digital Input Status as follows.

Menu				Status		DI		 mem 12:49:57 84% 02/17/13	
DI	DO	AO	Counter	Totalizer					
No	Name			Value	Desc				
1	DI1			Hi	Tank1 Level switch high				
2	DI2			Low	Tank2 Level Switch High				
									</

### 7.1.3 Math Channel

Maximum no. of Math channels in various PR series Recorders are as follows

PR Recorder	PPR 500
Maximum Math Channels	40

Path:  (Menu)-More-Config-Math

After entering the Configuration mode, in the Channel, select Math, then Press the **“Enter”** soft button to get into Math Channel configuration page.

Math									
1	2	3	4	5	6	7	8	9	
Name: Math1									
Desc: Math channel 1									
Type: Math									
Log									
DataType: 4 Byte									
Value Range: -3.4E+38 ~ 3.4E+38									
Trigger: Enable									
Method: Instant									
Speed: 100ms/Dot									
Expression: (AI1+AI2)/2									
Scale									
Unit:									
Transformation: Disable									
Decimal: 1									
Range: -214748364.8 ~ 214748364.7									

**Name:** Define name for the Math channel

**Desc:** Define detail description for the channel name

**Type:** Define either Math or Totalizer or Counter

Note: Based on selection at “Type”, configuration details will be changed. For ex: Type=Math have a different configuration details compared with Type = Totalizer or Type = Counter

**Log data type, Trigger, Method, Speed:** Same as Analog Input

Press **Back** key and then press “**Home**” soft button go to Real time display and memorize the Math settings.

Enter Expression column, it appears Source, Operator and a keyboard.

The Source covers all available Analog inputs, Digital Inputs, Math inputs, external channels.

The Operators are Mathematics expressions described below.

Use Source, Operator and keyboard to define the Math equation.

Scale  
 Unit: Tons  
 Transformation: Value  
 Table: Point 1 to 8  
 Range: 0 ~ 170

**Transformation:** Select disable, value or Math channel. This function mainly used to display process values obtained from Non-linearization table

**Table:** Select disable, value or Math channel

Maximum 64 rows can be entered in the Transformation table

Ex: A chemical tank is with non-linear shape. Level is 0 to 1400 cms. The Recorder should display 0 to 170 Tons as per following table

No	Input	Output
1	0	0
2	200	10
3	400	30
4	600	80
5	800	130
6	1000	150
7	1200	160
8	1400	170

Add: Press “Add” soft button to add a new row into the Transformation table

Delete: Press “Delete” soft button to delete existing row from the Transformation table

Copy: “Press” to copy existing row in the Transformation table to create a duplicate entry

Mode: Press to toggle between Input and Output entries in the Transformation table

Up & Down: To navigate among rows in the Transformation table

### ● Math Expression

#### Expressions

+  
-

#### Mathematics Functions

Addition  
Subtraction

*	Multiplication
/	Division
SIN(x)	$\sin(x)$
COS(x)	$\cos(x)$
EXP(x)	$e^x$
SQRT(x)	Square root of x
LN(x)	$\log_e(x)$
LOG(x)	$\log_{10}(x)$
ABS(x)	Absolute of x
POW (x,y)	$x^y$
ROUND(x)	The closest integral number to x
HI(x,y)	The bigger value between x and y
INV(x)	$1/x$
TG(x)	$\tan(x)$
CTG(x)	$1/\tan(x)$
ASIN(x)	$\sin^{-1}(x)$
ACOS(x)	$\cos^{-1}(x)$
ATG(x)	$\tan^{-1}(x)$
$x\%y$	Remainder of x/y
$x^y$	$x^y$

### ● Math Example-1

#### Relative Humidity – PPR 500 Math application

/\*How to Calculate Relative Humidity - Theory

Requirement: Two Analog Inputs, Type: RTD

AI1: To measure dry bulb temperature

AI2: To measure wet bulb temperature

First calculate the saturation vapor pressure (E) for both the dry-bulb (Td) and wet-bulb (Tw) temperatures using the following equations:

$$E_w = 0.61078 \cdot \exp((17.269 \cdot T_w) / (T_w + 237.3)) \cdot (T_d - T_w)$$

$$E_d = 0.61078 \cdot \exp((17.269 \cdot T_d) / (T_d + 237.3)) \cdot (T_d - T_w)$$

In the above equations the temperatures units are Celsius and the saturation vapor pressure units are millibars. The function "EXP" is the exponential and not raising something to an exponent.

Then calculate actual vapor pressure (Ea) using the following equation:

$$Ea = Ew - 0.63 \cdot (Td - Tw)$$

Relative Humidity is then calculated using the following equation:

$$RH = (Ea / Ed) \cdot 100$$

The units of relative humidity are in percent.

Here is an example of the using the equations:

Assume that your dry-bulb temperature (Td) = 40 C and your wet-bulb temperature (Tw) = 30 C.

$$Ew = 0.61078 \cdot \exp((17.269 \cdot Tw) / (Tw + 237.3)) \cdot (Td - Tw)$$

$$Ew = 0.61078 \cdot \exp((17.269 \cdot 30) / (30 + 237.3)) \cdot (40 - 30)$$

$$Ew = 42.4262 \text{ millibars}$$

$$Ed = 0.61078 \cdot \exp((17.269 \cdot Td) / (Td + 237.3)) \cdot (Td - Tw)$$

$$Ed = 0.61078 \cdot \exp((17.269 \cdot 40) / (40 + 237.3)) \cdot (40 - 30)$$

$$Ed = 73.7416 \text{ millibars}$$

$$Ea = Ew - 0.63 \cdot (Td - Tw)$$

$$Ea = 42.4262 - 0.63 \cdot (40 - 30)$$

$$Ea = 36.1262 \text{ millibars}$$

$$RH = (Ea / Ed) \cdot 100$$

$$RH = (36.1262 / 73.7416) \cdot 100$$

$$RH = 48.99 \%$$

\*/ End of Theory

5 Math channels are required to calculate one RH.

Td = AI1, analog input for dry bulb temperature (PT100)

Tw = AI2, analog input for wet bulb temperature (PT100)

$$\text{Math1} = \exp((17.269 \cdot AI1) / (AI1 + 237.3))$$

$$\text{Math2} = Ed1 = 0.61078 \cdot \text{Math1} \cdot (AI1 - AI2)$$

$$\text{Math3} = \exp((17.269 \cdot AI2) / (AI2 + 237.3))$$

$$\text{Math4} = Ew1 = 0.61078 \cdot \text{Math3} \cdot (AI1 - AI2)$$

$$Ea = Ew - 0.63 \cdot (Td - Tw)$$

$$\text{Math5} = RH1 = ((\text{Math4} - 0.63 \cdot (AI1 - AI2)) / \text{Math2}) \cdot 100$$

Name: Math1  
 Desc: Math Channel 1  
 Type: Expression  
 Log  
 Expression:  $\text{EXP}((17.269 \cdot \text{AI1}) / (\text{AI1} + 237.3))$

Name: Math1  
 Desc:  
 Type: Math  
 Log  
 DataType: 4 Byte  
 Value Range:  $-3.4\text{E}+38 \sim 3.4\text{E}+38$   
 Trigger: by Time  
 Method: Instant  
 Speed: 1 Sec/Dot  
 Expression:  $\text{EXP}((17.269 \cdot \text{AI1}) / (\text{AI1} + 273.3))$

Name: Math2  
 Desc:  
 Type: Math  
 Log  
 DataType: 4 Byte  
 Value Range:  $-3.4\text{E}+38 \sim 3.4\text{E}+38$   
 Trigger: by Time  
 Method: Instant  
 Speed: 1 Sec/Dot  
 Expression:  $0.61078 \cdot \text{Math1} \cdot (\text{AI1} - \text{AI2})$

Name: Math3  
 Desc:  
 Type: Math  
 Log  
 DataType: 4 Byte  
 Value Range:  $-3.4\text{E}+38 \sim 3.4\text{E}+38$   
 Trigger: by Time  
 Method: Instant  
 Speed: 1 Sec/Dot  
 Expression:  $\text{EXP}((17.269 \cdot \text{AI2}) / (\text{AI2} + 273.3))$



Name: Math4  
 Desc:  
 Type: Math  
 Log  
 DataType: 4 Byte  
 Value Range:  $-3.4E+38 \sim 3.4E+38$   
 Trigger: by Time  
 Method: Instant  
 Speed: 1 Sec/Dot  
 Expression:  $0.61078 * \text{Math3} * (\text{AI1} - \text{AI2})$


Name: Math5  
 Desc:  
 Type: Math  
 Log  
 DataType: 4 Byte  
 Value Range:  $-3.4E+38 \sim 3.4E+38$   
 Trigger: by Time  
 Method: Instant  
 Speed: 1 Sec/Dot  
 Expression:  $((\text{Math4} - 0.63 * (\text{AI1} - \text{AI2})) / \text{Math2}) * 100$

Now, in Math5, you will get Relative humidity in %

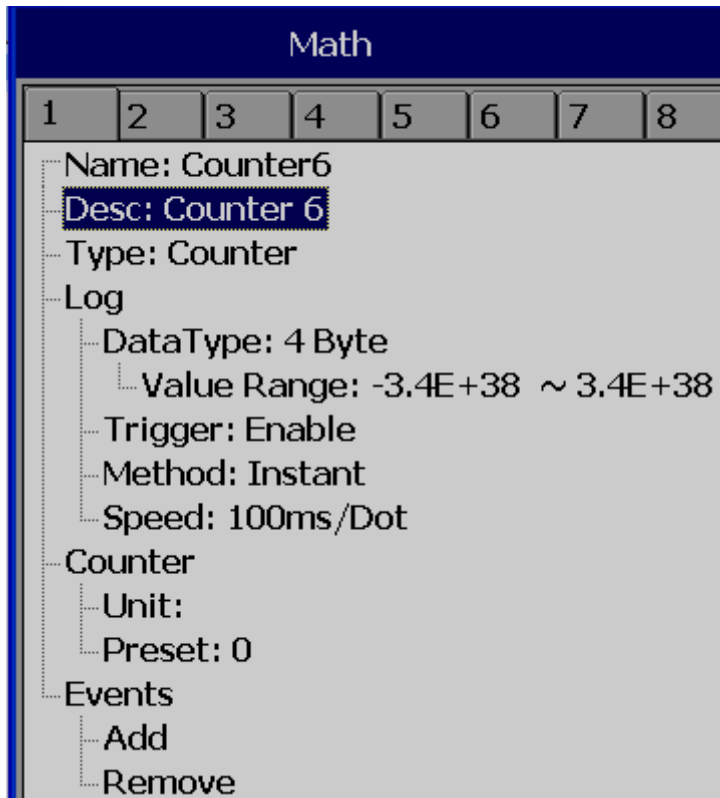
Five events are supported for every Math channel and two jobs are available in every event same as Analog input channel.

Math channels are virtual channels. It contains measured value based on the equations. These values can be recorded similar to physically connected Analog inputs and display digital values, trends, bar graphs etc.

- **Counter**

Path:  (Menu)-More-Config/Math

Select **Type = Counter**



Press directional keys < > at the bottom to select one of the Math channel for the Counter operation.

**Name:** Defines the name of counter, max. 18 characters allowed

**Desc:** Defines the description for a specific counter on the display

**Type:** Select **Counter**

**Counter**

**Unit:** Defines the unit of counter

**Preset:** Defines the preset value for the counter.

**Event:** Defines the type, Set point, Log, Job1 or Job2 & Hysteresis

**Type:** Select one of the options: H, L, HH, LL, Dev+, Dev-, Error

**Set point:** Defines the set point trigger of Counter value to initiate Jobs and/or Log alarms

**Log:** Select one of Log Alarm, Log Alarm (Auto Ack.), Log Event

**Job1, Job2:** various jobs can be assigned, 2 jobs for each counter

**Hysteresis:** To avoid jobs have been activated too often, it can set for no reaction. Hysteresis value can be defined for the event trigger set point

### ● Counter Example-1

Operator wish to know the number of occurrence of an event in a day say pressure switch signal high

Digital input1 is used for Pressure switch. High signal indicates High pressure, Low signal indicates normal pressure

DI	
1	2
Name: DI1	
Desc: Pressure Switch	
Events	
Add	
Remove	
1	
Type: H	
Log: No Action	
Job1: Inc Counter_Counter1	
Job2: No Action	

Timer						
1	2	3	4	5	6	7
Type: Daily						
Action: Enable						
Time						
Hour: 23						
Min: 59						
Sec: 1						
Job1: Log Report_Counter1						
Job2: Reset Counter_Counter1						

(Reset Counter1 historical data in order to log new data for the next day)

Archive historical data by pressing the following.

 (Menu)-Event-Report, Select Daily in the Mode

If values meet the following conditions, paperless recorder will change notation from traditional to scientific

- a. the value is more than  $10^5$  or less than  $1/(10^5)$
- b. the value digit-length in display exceeds the allowed range

Ex: Up to 5 digits, counter displays value directly Say 0-99999.

100000 will be shown as 1E5 that means 5 zero's after 1

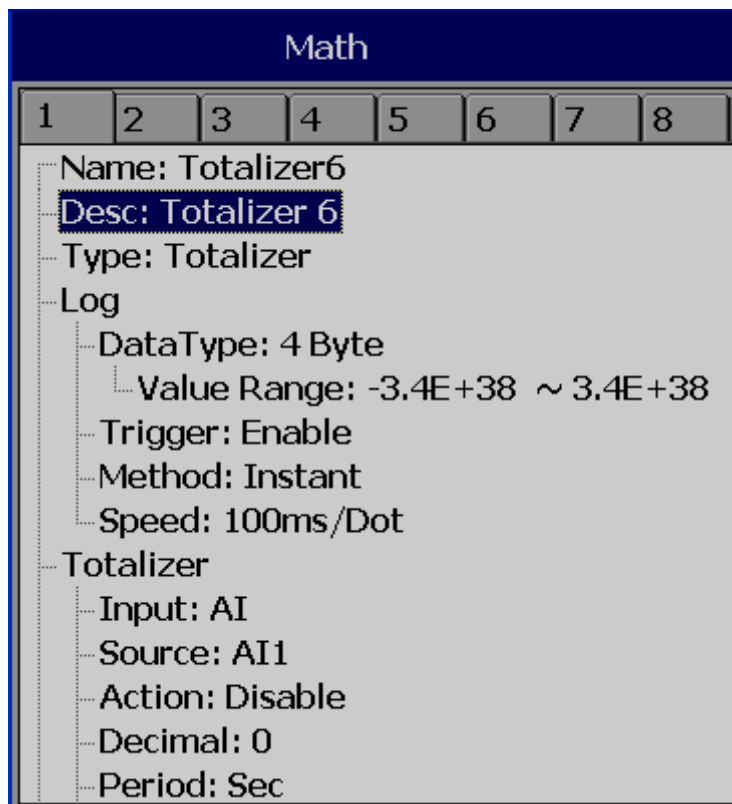
4294967295 will be shown as 4.29497E9 etc.

### ● Totalizer

In New generation Recorder, Totalizer is a part of Math channel.

Configuration Path:  (Menu)-More-Config-Math

Select **Type = Totalizer**



The screenshot shows a configuration window titled 'Math' with a tabbed interface (tabs 1-8). The active tab shows the following settings:

- Name: Totalizer6
- Desc: Totalizer 6
- Type: Totalizer
- Log
  - DataType: 4 Byte
  - Value Range: -3.4E+38 ~ 3.4E+38
- Trigger: Enable
- Method: Instant
- Speed: 100ms/Dot
- Totalizer
  - Input: AI
  - Source: AI1
  - Action: Disable
  - Decimal: 0
  - Period: Sec

Press directional keys < > at the bottom to select from available Totalizers

**Name:** Defines the name of the Totalizer, Maximum 18 characters allowed

**Desc:** Defines the description for a specific Totalizer on the display

**Type:** Select "Totalizer"

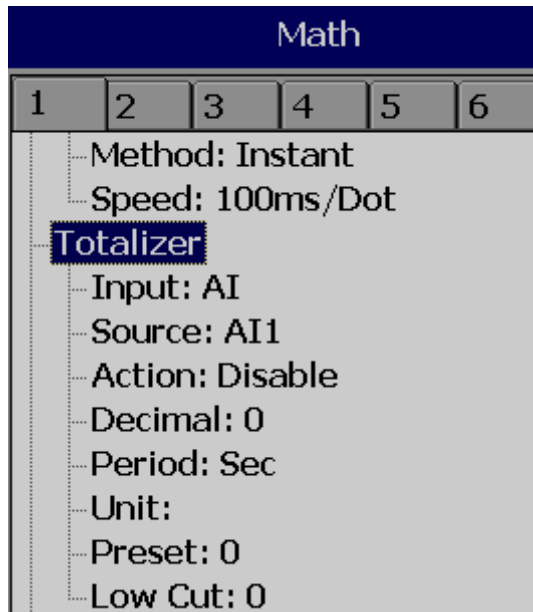
**Log:** Same as Analog input configuration

**Totalizer:**

**Input:** Analog Input (AI) or Pulse Counter (DI)

**Source:** Select the source for the Totalizer from Analog input/Math/Counter/Totalizer

**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.

**Low Cut:** Defines the Low Cut for the Totalizer.

For ex: If 0.0 is set as Low cut, then, if source channel, AI1 is less than 0.0, then, Totalizer value will not go to negative.

**Event:** Total 5 events are supported for each Math channel. Defines the type, Set point, Log, Job1 or Job2 & Hysteresis

**Type:** Select one of options, H, L, HH, LL, Dev+, Dev-, Error

**Set point:** Defines the set point trigger of Totalizer value to initiate Jobs and/or Log alarms

**Log:** Select one of Log Alarm, Log Alarm (Auto Ack.), Log Event

**Job1, Job2:** various jobs can be configured, 2 jobs for each Totalizer

**Hysteresis:** To avoid jobs have been activated too often, it can set for no reaction. Hysteresis value can be defined for the event trigger set point

## ● Totalizer Example-1

Water flow rate is in M<sup>3</sup>/Sec. Operator want to know about total water discharged and want this information daily, weekly and monthly reports

```

Name: Totalizer1
Desc:
Type: Totalizer
Log
  DataType: 4 Byte
  Value Range: -3.4E+38 ~ 3.4E+38
  Method: Instant
  Speed: 1 Sec/Dot
  
```

Timer						
1	2	3	4	5	6	7
Type: Daily						
Action: Enable						
Time						
Hour: 23						
Min: 59						
Sec: 1						
Job1: Log Report_Totalizer1						
Job2: Reset Totalizer_Totalizer1						

Reset Totalizer1 historical data in order to log new data for the next day



Archive historical data by pressing the following.

Path:  (Menu)-Event-Report

Select **Daily** in the **Mode** to see reports on day basis, to navigate for other day, press on Left and right arrows below the **Mode** button. Select **Weekly** in the **Mode** to see weekly reports and **Monthly** on the **Mode** to see Monthly reports.

### 7.1.4 Analog Output

After entering the Configuration, in the Channel, select AO, then Press the “Enter” soft button to get into Analog Output Channel configuration page.

AO						AO1		mem 81%	
1	2	3	4	5	6				
<p><b>Desc:</b></p> <p>Type: Current</p> <p>Output: 4-20mA</p> <p>Expression: <math>4+(20-4)*(AI1-(-120))/(1000-(-120))</math></p>									


**Desc:** Define detail description for the channel name

**Type:** Current, Voltage

**Output:** Select either disable, 0 to 20 ma , 4-20 mA, 0-5V, 1-5V, 0-10VDC

**Expression:** This is similar to Math channel.

### 7.1.5 Digital Output

DO		DO1		mem 81%	04:10:21 02/17/13
1	2				
<p><b>Desc:</b></p> <p>Reverse: Disable</p>					
			  		
 		Copy	Back		

**Desc:** Define detail description for the channel name

**Reverse:** Enable this if Reverse operation required for the Digital Output.

For ex: Normally, Relay output is Normally Open (NO). In case if you need to get Normally Close (NC) at Recorder Power ON, then, enable Reverse for selected Digital Output. The operation is Relay output shall be reversed

### 7.1.6 External

This is to access data from the external devices.

Maximum no. of external channels in various PR series Recorders are as follows

PR Recorder	PPR 500
Maximum External Channels	48

All the properties are similar to Analog Input channel.

More details about external channels are available at section “Communication”

The screenshot shows the 'External' configuration screen for 'Ext1'. The top bar indicates 'mem 37%' and the time '2:14:35' on '10/21/13'. The channel list at the top shows channels 1 through 14. The configuration details for 'Ext1' are as follows:

- Name: Ext1
- Desc:
- Type: Enable
- Log
- DataType: 2 Byte
- Value Range: -32768 ~ 32767
- Trigger: Enable
- Method: Instant
- Speed: 100ms/Dot
- Modbus Register Value(MV) Conversion
- DataType: 2 Byte
- Formula:  $((MV-RL)/(RH-RL))*(SH-SL)+SL$
- Range
- Low(RL): 0.0
- High(RH): 65535.0

Navigation buttons at the bottom include 'Back', 'Copy', and 'Next'.

Please refer section “Communication” for examples of external channels



### 7.1.7 Jobs

Various types of jobs can be selected as follows.

**No Action:** Do nothing

**Send Email:** Send Email directly from Recorder

**Pause:** Stop logging data.

**Start:** Start logging data.

**Sound Buzzer:** Sound the buzzer. It stops once any key is pressed.

**Dump Data:** To dump data from internal memory to external memory.

**DO Latch On:** Set digital output / relay on, and then select Target, say from one of DO 1 to DO 6. The relay is latched when it is activated.

**DO Latch Off:** Set digital output / relay off, and then select Target say, from one of DO 1 to DO 6. The relay is latched when it is activated.

**DO Process:** Set digital output / relay on for process high or low, and then select Target Say, from 1 of DO 1 to DO 6. The relay is not going to be latched when it is activated.

**Enable Timer:** Start the timer, and then select Target timers

**Disable Timer:** Stop the timer, and then select Target from Timers

**Preset Totalizer:** set a preset value to the target Totalizer.

**Reset Totalizer:** Reset Totalizer into zero, and then select Target Totalizer or All totalizers

**Enable Totalizer:** Start the Totalizer, then select Target Totalizer or All totalizers

**Disable Totalizer:** Stop the Totalizer, then select Target Totalizer or All totalizers

**Preset Counter:** set a preset value to the target counter.

**Reset Counter:** Resets the counter into zero, and then select Target counter or All counters

**Inc Counter:** Increase 1 to the counter, and then select Target counter or All counters


**Dec Counter:** Decrease 1 from the counter, and then select Target counter or All counters

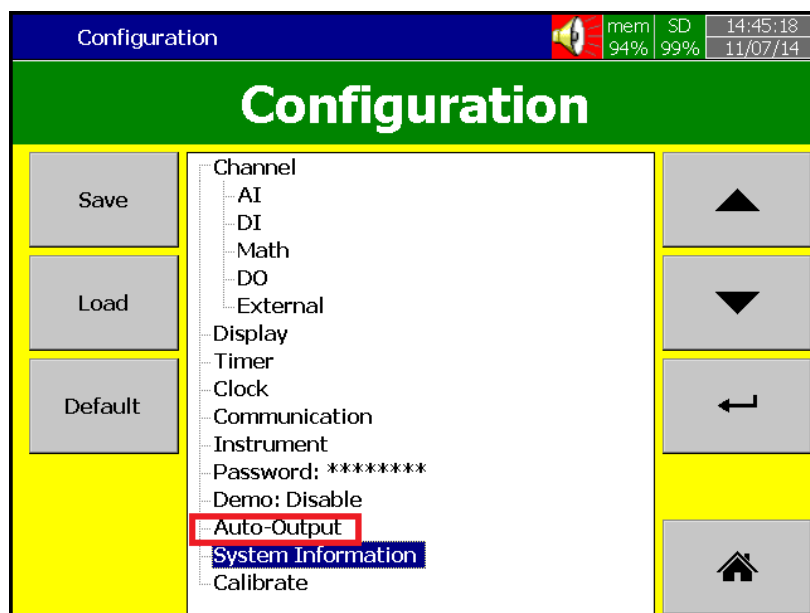
**Log Report:** Make the report for Counter, Totalizer, Analog inputs Min/Max/Avg, Math Min/Max/Avg, All Counters, All Totalizers, All Channels Min/Max/Avg. Choose this column, and then the report will be presented as details described in section “Reports”

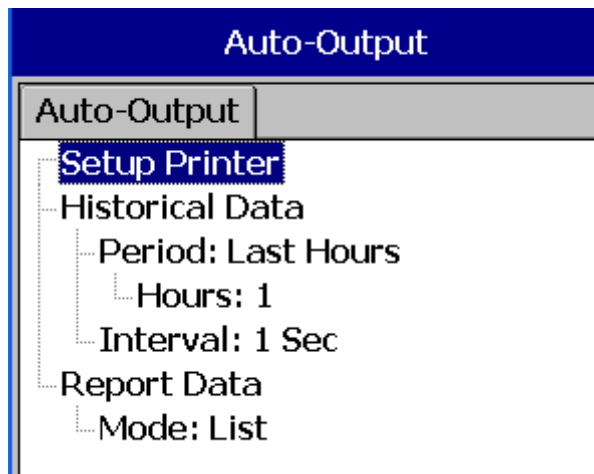
**Reset MinMaxAve:** In Report function, after logging the MinMaxAve data of AI and Math channels for one day for example, then reset historical data in order to logging new data for the next day. It is also possible to reset MinMaxAve for “All Channels” at one step.

**Print:** If Printer is connected to Paperless Recorder via USB port or Ethernet, then, the following print jobs can be triggered from the events

- Print Historical data
- Print Event List
- Print Report List
- Print Snapshot

The time period and internal depends on default configuration available at  (Menu)-More-Config-Auto-Output





Note: Please refer section “Auto Output” for more details about options available

**Note:**


- ◆ In the mode the sampling rate of the recorder is fixed at 100 milli seconds by the hardware, i.e. 10 samples are collected per second. If the logging speed is set at 1 second in Instant mode, the recorder logs using the last of ten measured data values. For the same speed in Average mode, the recorder logs using the average of the Ten measured data values. For the same speed in the Maximum or Minimum mode, then the recorder logs using the maximum or minimum of the Ten measured data values.

Sampling	Logging (historical trend)	Display (real time)
Instant	100mS the last of 10 measured data	the last of 10 measured data
Averaged	100mS the average of 10 measured data	the last of 10 measured data
Maximum	100mS the maximum of 10 measured data	the last of 10 measured data
Minimum	100mS the minimum of 10 measured data	the last of 10 measured data

Press “**Home**” key to return to real-time display, all configurations will be memorized

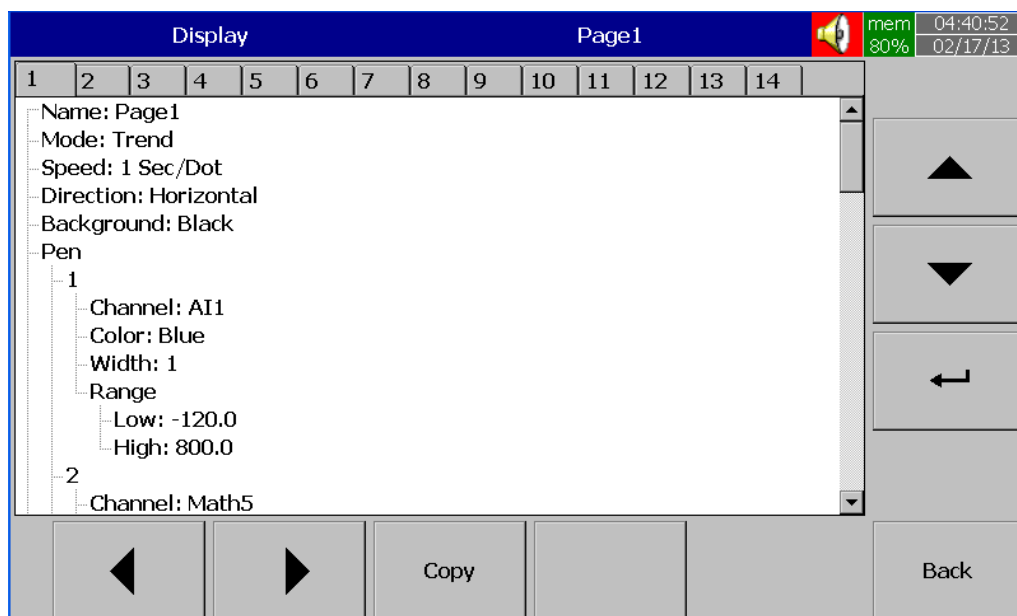
- ◆ The Digital output DO card with relay can be set in Job1, Job2. It can be traced in System Info mode after installed into the Slot.

## 7.2 Display

Path:  (Menu)-More-Config-Display

Select **"Display"** and press **"Enter"** Soft button to get into Display mode configuration page.

	PR10	PR20	PR30
Display pages	8	20	21
Pens/Page	6	6	10



**Name:** Defines the name of the display page

**Mode:** Defines the default method of displaying data for the page. Options are: Trend, Bar, Digital, Mix and Disable modes.

**Speed:** This is display speed. Available options are 100 msec/dot, 1 Sec/dot, 2 Sec/dot, 5 Sec/dot, 10 Sec/dot, 20 Sec/dot, 30 Sec/dot, 1 min/dot, 5 min/dot, 10 min/Page, 30 min/Page, 1 hour/Page, 2 hour/Page, 4 hour/Page, 8 hour/Page, 12 hour/Page and 1 Day/Page.

**Direction:** Selects the trend direction horizontal or vertical.

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

**Pen:** Defines a specific channel as a drawing pen, its color, width, Range Low and Range High for the display.

**Channel:** Selects a specific analog input, Math, Counter, Totalizer, External channels. Select Disable if a specific channel is not required to be displayed.

**Color:** Selects the color for each pen.

**Width:** Selects the width of 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.

**Note:**

- ◆ To illustrate the difference between Display Hi, Display Lo and Scale Hi, Scale Low. Here is a typical example, with input 0-10V, Scale Low=0.00, Scale Hi=100.00, to have better resolution and vision on Bar, set Display Lo=0.00, Display Hi=50.00 so that the Bar displays from value 0.00 to 50.00.
- ◆ The decimal point is defined by Scale Hi and Scale Low, and not by Display Hi, or Display Lo.

### 7.2.1 Status Bar

**Status Bar:** To make it convenient when viewing the status of Digital Input, Digital Output, Math channel, Totalizer, Counter and AO, the user may enable these items in the status bar. Status bar shall be displayed at Lower part of the page. Maximum 10 tags can be displayed in each Status bar. One status bar can be configured for each page.

**Note:** Status bar configuration is not common for all the pages. You may define different setup for status bar in different pages as per your requirements.

#### Status Bar

Type: Enable

1: DI1

2: DI2

3: DO1

4: DO2

5: Math1

6: Counter1

7: Totalizer1

8: AO1

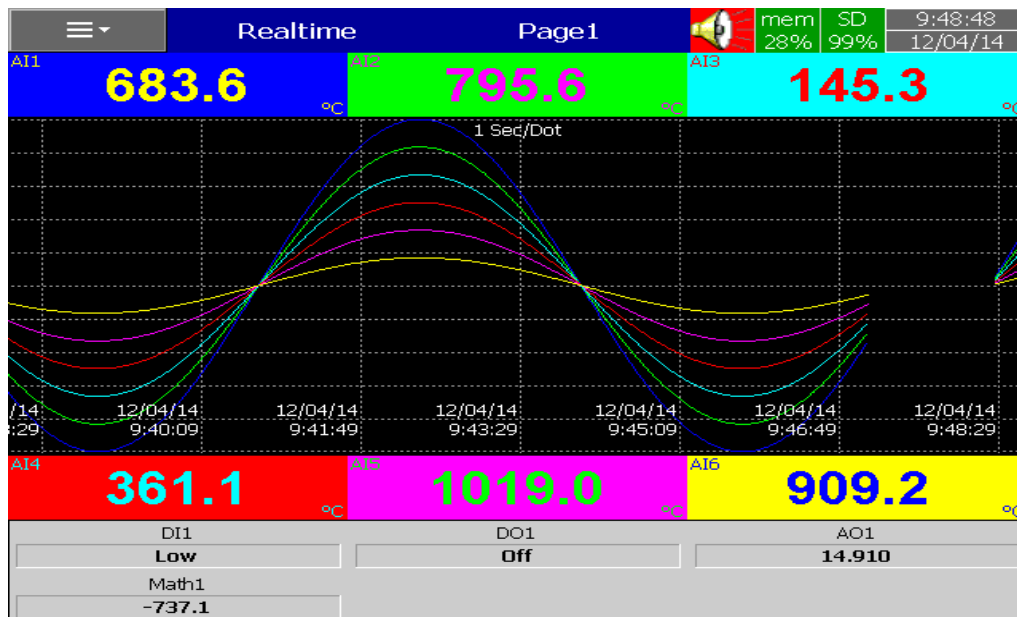

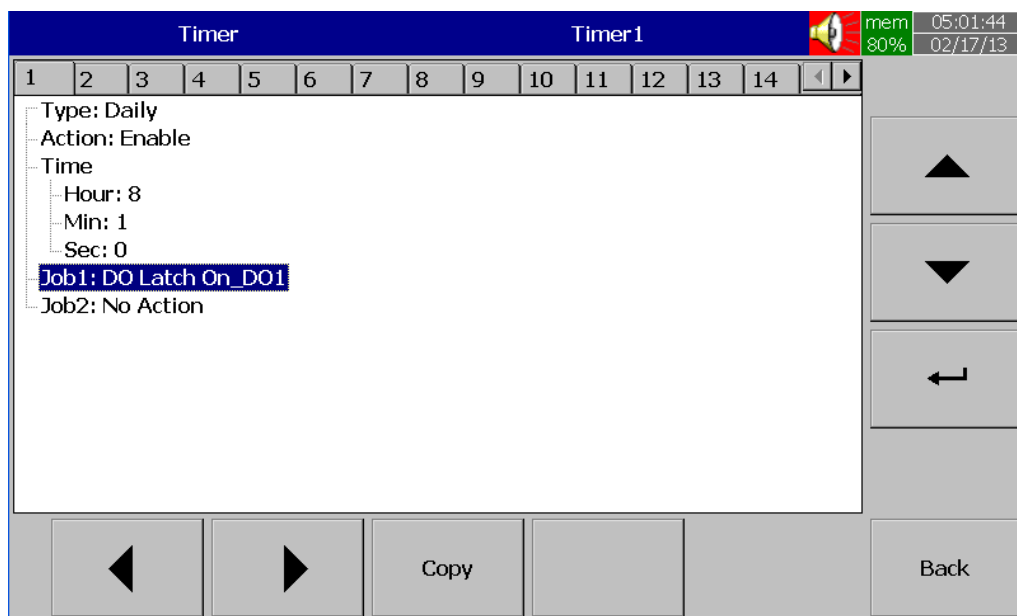


Fig: Status bar display in Real time

### 7.3 Timer

Path:  (Menu)-More-Config-Timer



Press directional keys < > at the bottom to select one from 20 available timers.

**Type:** Countdown, Repeat Countdown, Daily, Weekly or Monthly.

**Countdown:** Defines the interval of time, e.g. days, hours, minutes and seconds.  
(Not Real Time)

**Repeat Countdown:** Repeats the previous countdown. (Not Real Time)

**Daily, Weekly or Monthly:** The timer works in selected interval of Real Time.

**Action:** Disables or enables the timer.

**Job1, Job2:** 2 jobs can be configured for each timer.

#### ● Timer Example-1

Switch on water pump every day at 8.00 hrs and switch off at 10.00 hrs

This application requires to Daily type timer which works with Real Time Clock.

Configuration settings are as follows.

##### Timer1

Type: Daily                      Action: Enable  
Time – Hour: 8   Min: 0   Sec: 0  
Job1: DO Latch On, Target: DO1  
Job2: No Action

##### Timer2

Type: Daily                      Action: Enable  
Time – Hour: 10 Min: 0   Sec: 0  
Job1: DO Latch Off, Target: DO1  
Job2: No Action

#### ● Timer Example-2

Once digital input high event is triggered say pressure high, you would like switch on relay after a delay of 10 sec

##### Digital Input1

Event1  
Type: H  
Job1: Enable Timer, Target: Timer1  
Job2: No Action

Event2  
Type: L  
Job1: DO Latch Off, Target: DO1  
Job2: No Action

### Timer1

Type: Countdown, Action: Disable  
Time – Hour: 0 Min: 0 Sec: 10  
Job1: DO Latch On, Target: DO1  
Job2: No Action

### ● Timer Example-3

Timer & Report:


**A staff plans to get a daily report from the recorder about the minimum, maximum and average values of the process every day. After the production has finished, he can press Menu, then Event, select Report and press Mode key to select Daily mode and get the report like figure shown below**

### Timer1

Type: Daily Action: Enable  
Time – Hour: 17 Min: 01  
Job1: Log Report Target: ALL CH MinMaxAve  
Job2: Reset MinMaxAve Target: ALL CH  
(Reset historical data in order to logging new data for the next day.)

Menu

Report


mem 05:02:21  
86% 02/17/13


Event Report


02/17/13

No	Type	Name	Value	Time
1	Channel	AI1	1000.0\120.0\441.9 °C	5:01:01 PM
2	Channel	AI2	1271.9\101.9\587.4 °C	5:01:01 PM
3	Channel	AI3	318.8\168.8\75.8 °C	5:01:01 PM
4	Channel	AI4	712.5\87.5\401.1 °C	5:01:01 PM
5	Channel	AI5	1365.0\455.0\911.6 °C	5:01:01 PM
6	Channel	AI6	1215.4\552.4\885.0 °C	5:01:01 PM
7	Channel	AI7	1104.9\662.9\884.7 °C	5:01:01 PM
8	Channel	AI8	621.9\428.1\525.3 °C	5:01:01 PM
9	Channel	AI9	1832.0\184.0\855.6 °F	5:01:01 PM
10	Channel	AI10	2321.4\151.4\1123.8 °F	5:01:01 PM
11	Channel	AI11	605.8\271.8\180.8 °F	5:01:01 PM
12	Channel	AI12	1314.5\189.5\769.7 °F	5:01:01 PM
13	Channel	AI13	2489.0\851.0\1695.7 °F	5:01:01 PM
14	Channel	AI14	2219.6\1026.4\1641.7 °F	5:01:01 PM
15	Channel	AI15	2020.8\1225.3\1635.5 °F	5:01:01 PM
16	Channel	AI16	1353.9\960.1\1163.2 °F	5:01:01 PM

Mode  
List










## 7.4 Clock

Path:  (Menu)-More-Config-Clock

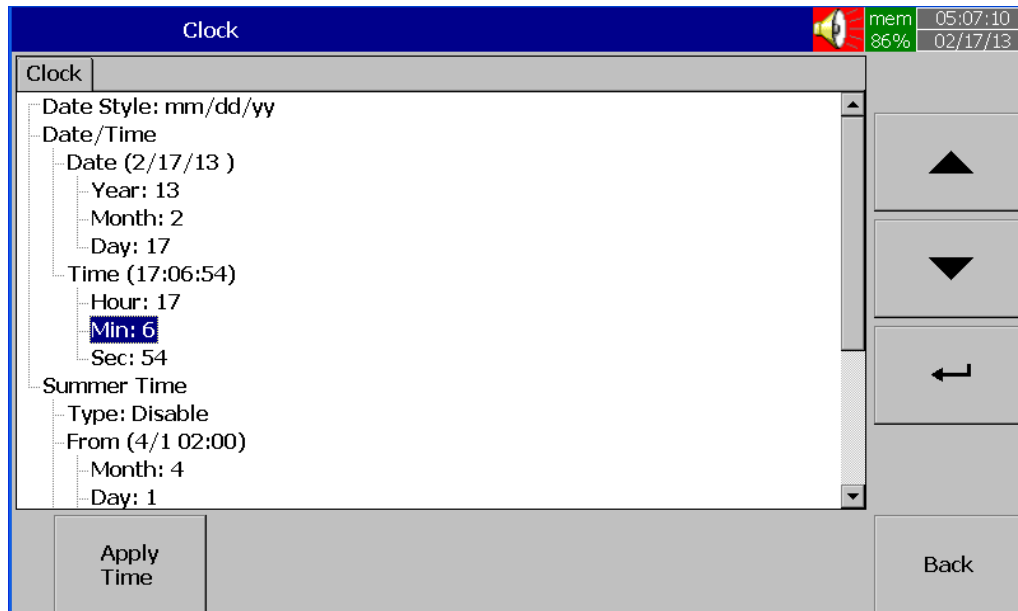


Fig: Clock configuration page in Paperless Recorder

**Date Style:** Selects either month/date/year or date/month/year

**Date/Time:** Set up the local time. Use directional keys Up/Down to select the column, press “**Enter**” soft button to change the clock data. Then press on “**Apply Time**” Soft button to apply it to the recorder.

**Summer time:** In some countries of North America and Europe, clocks are adjusted forward one hour near the start of spring and are adjusted backward in autumn for energy saving purpose because of change in day light conditions. Summer time set provision is available in paperless recorder. In Summer time, Select Type: Enable and then set Start (Month, Day, Hour, Min) and End (Month, Day, Hour, Min) details.

## 7.5 Communication

### Ethernet

**IP:** Automation/User define

Select **Automation** if the server on the network automatically allocates the IP address for the recorder.

Select **User Define** to manually set a fixed address for the recorder.

**IP Address:** Defines the correct address of the recorder on the network

**Subnet Mask:** Defines the correct **Subnet Mask** address on the network

**Default Gateway:** Define Gateway address.

**DNS Server:** This is required if recorder is to be connected to Internet

**Modbus Server:**

**Modbus TCP Port:** Default: 502 for Modbus TCP

### Serial:

**Protocol:** Modbus RTU Master/ Modbus RTU Slave

**Address:** Address of Master/Slave in the network

**Baud rate:** 9600/14400/19200/38400/57600/115200

**Data format:** None, 8, 1 or Odd, 8, 1 or Even, 8, 1

## Modbus Client/Master:

**Sample Rate:** Ethernet: 100 msec/dot, 1 sec/dot, 2 sec/Dot, 5 sec/dot, 10 sec/dot

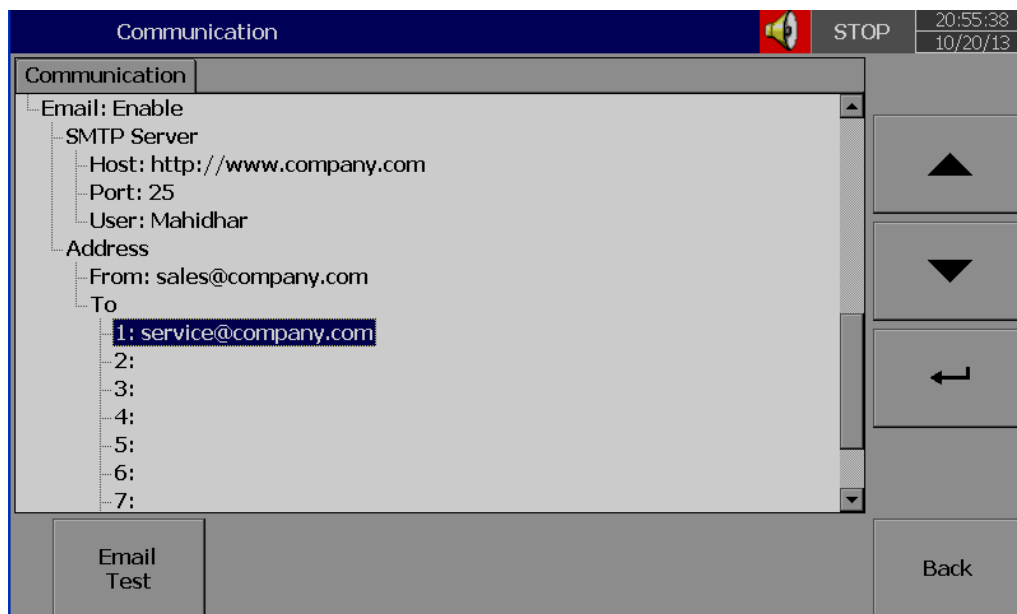
Timeout : The default timeout is 100ms

Serial: 100 msec/dot, 1 sec/dot, 2 sec/Dot, 5 sec/dot, 10 sec/dot

Timeout : The default timeout is 100ms

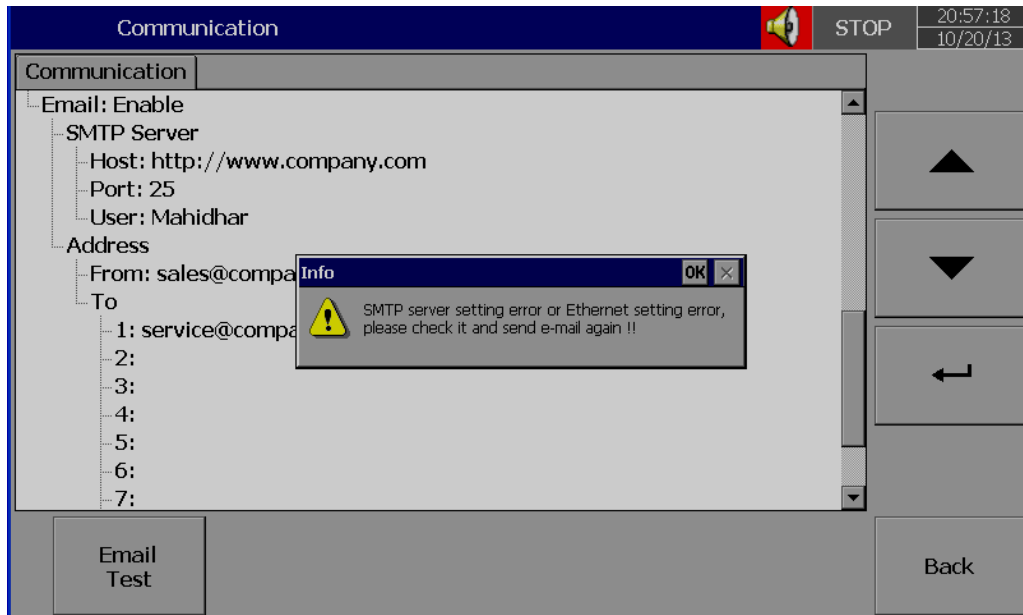
Interval between 2 commands : The default timeout is 10ms

**Email:** Enable/Disable



Press 'Email Test' and check mail function

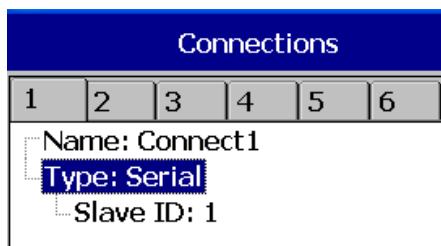
If any problems with Email delivery, it will show error as shown attached



### 7.5.1 Connections

Total 16 connections are available

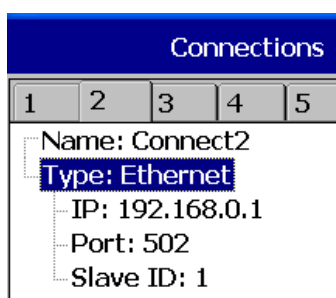
Each connection can be configured as either Serial or Ethernet



**Name:** Connection name

**Type:** Serial/Ethernet

**Slave ID:** If Recorder is Modbus RTU Master, then, all the Slaves need to be configured in the connections.



**IP:** This is enabled only if Type = Ethernet selected at any connection

## 7.5.2 Commands

Total 16 commands are available

Commands					
1	2	3	4	5	6
Action: Disable					
Channel					
First: Ext1					
Last: Ext1					
Device					
Register					
Start Address: 1					
Data Type: Int16					
Connection: Connect1					

**Action:** Enable/Disable

**To Channel:**

**First:** Enter first external channel details, Ex : Ext1

**Last:** Enter last external channel details, Ex: Ext24

**From Device**

**Register:**

**Start Address:** Enter Start register address

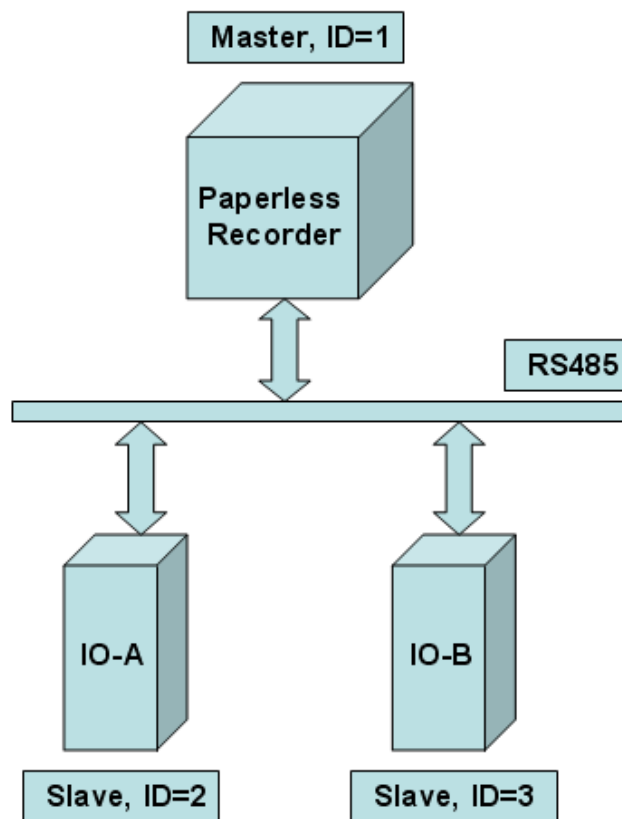
**Data Type:** Int16/Uint16/Int32\_B/Int32\_L, Uint32\_B, Uint32\_L, Float\_B, Float\_L

**Connection:** Select the required connection

### 7.5.3 Modbus RTU Master, Example1

Master: Paperless Recorder

Slaves: External IO modules, 2 nos. each with 8 channel Analog inputs



Modbus Address	Register Name	Low Limit	High Limit	Access
30002	Analog Input 1	0	4095	R
30003	Analog Input 2	0	4095	R
30004	Analog Input 3	0	4095	R
30005	Analog Input 4	0	4095	R
30006	Analog Input 5	0	4095	R
30007	Analog Input 6	0	4095	R
30008	Analog Input 7	0	4095	R
30009	Analog Input 8	0	4095	R

Fig: External IO modules Register table

## Master Configuration

### Serial

- RS232/485
  - Protocol: Modbus Master
  - Address: 1
  - Baud Rate: 38400
  - Data Format: No,8,1

## Slave Configuration

Connections					
1	2	3	4	5	6
Name: Connect1 Type: Serial Slave ID: 2					

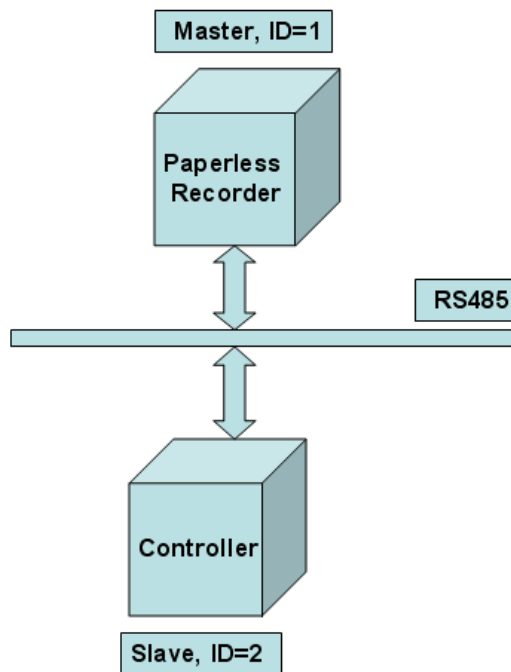
Connections					
1	2	3	4	5	6
Name: Connect2 Type: Serial Slave ID: 3					

Commands					
1	2	3	4	5	6
Action: Enable To Channel <ul style="list-style-type: none"> <li>First: Ext1</li> <li>Last: Ext8</li> </ul> From Device <ul style="list-style-type: none"> <li>Register               <ul style="list-style-type: none"> <li>Type: Input</li> <li>Start Address: 2</li> </ul> </li> <li>Data Type: Int16</li> </ul> Connection: Connect1					

Commands					
1	2	3	4	5	6
Action: Enable To Channel <ul style="list-style-type: none"> <li>First: Ext9</li> <li>Last: Ext16</li> </ul> From Device <ul style="list-style-type: none"> <li>Register               <ul style="list-style-type: none"> <li>Type: Input</li> <li>Start Address: 2</li> </ul> </li> <li>Data Type: Int16</li> </ul> Connection: Connect2					

## 7.5.4 Modbus RTU Master, Example2

Master: Paperless Recorder  
Slave: PID Controller



Register Address	Parameter Notation	Parameter Description	Range	Default Value	Data type
128	PV	Process value	Low: -32768 High: 32767	—	R
129	SV	Set point value for control	Low: SPLO High: SPHI	—	R

Fig: External PID Controller Register table

### Master Configuration

```

Serial
├── RS232/485
│   ├── Protocol: Modbus Master
│   ├── Address: 1
│   ├── Baud Rate: 9600
│   └── Data Format: No,8,1
  
```



## Slave Configuration

Connections					
1	2	3	4	5	6
Name: Connect1 Type: Serial Slave ID: 2					

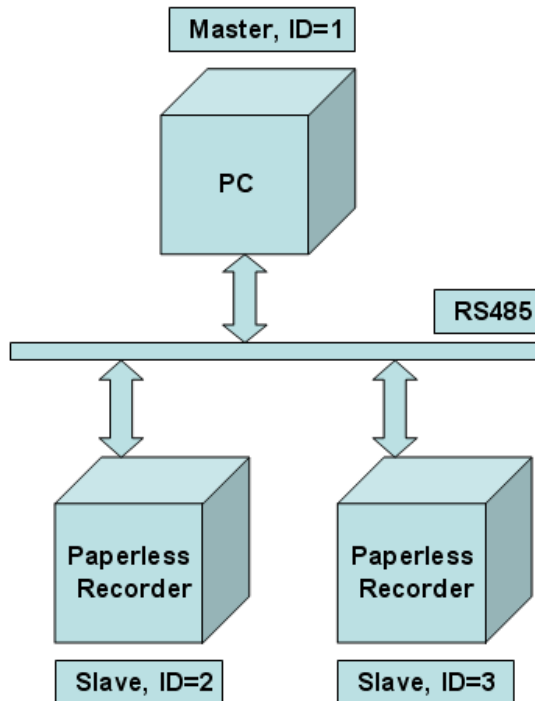
Commands						
1	2	3	4	5	6	7
Action: Enable To Channel First: Ext1 Last: Ext2 From Device Register Type: Input Start Address: 129 Data Type: Int16 Connection: Connect1						

External							
1	2	3	4	5	6	7	8
Name: Ext1 Desc: Log DataType: 2 Byte Value Range: -32768 ~ 32767 Trigger: by Time Method: Instant Speed: 1 Sec/Dot Range Low: -3276.8 High: 3276.7 Scale Unit: Low: -32768 High: 32767							

### 7.5.5 Modbus RTU Slave , Example

Master: PC, Modbus RTU OPC Server

Slaves: Paperless Recorders, 2 nos. each with 6 channel Analog inputs



1. Input Register Parameter Table

Address	Notation	Parameter	Scale Low	Scale High	Notes
0	AI1PV	AI1 process value	*1	*1	R
1	AI2PV	AI2 process value	*1	*1	R
2	AI3PV	AI3 process value	*1	*1	R
3	AI4PV	AI4 process value	*1	*1	R
4	AI5PV	AI5 process value	*1	*1	R
5	AI6PV	AI6 process value	*1	*1	R
6	AI7PV	AI7 process value	*1	*1	R

\*1: The scale high/low value are define in the following table for

Conditions	DP=0	DP=1	DP=2	DP=3	DP=4	DP=5
Scale low	-19999	-1999.9	-199.99	-19.999	-1.9999	-0.19999
Scale high	45536	4553.6	455.36	45.536	4.5536	0.45536

Fig: Paperless Recorder (Slave) Register table and Scaling information

- Serial
  - RS232/485
    - Protocol: Modbus Slave
    - Address: 2
    - Baud Rate: 38400
    - Data Format: No,8,1

## 7.6 Instrument

Instrument
Language: English Security Mode: Normal Batch Control: Enable Volume: 1 Tool Bar <ul style="list-style-type: none"> <li>AutoHide: Disable</li> </ul> Scan Page <ul style="list-style-type: none"> <li>Idle Time: Disable</li> </ul> LCD <ul style="list-style-type: none"> <li>Brightness: 4</li> <li>Screen Saver: Disable</li> </ul> Storage: Internal Flash Custom Page <ul style="list-style-type: none"> <li>Allow download via ethernet: Enable</li> </ul>

**Language:** Total 19 languages are supported. They include English, Simplified Chinese, Traditional Chinese, Japanese, Korean, French, German, Italian, Polish, Spanish, Portuguese, Brazil Portuguese, Russian, Thai, Czech, Danish, Dutch, Swedish & Turkish

**Security:** Select Normal or CFR-21 security. More details available at section "Security"

**Batch Control:** Disable and Enable options available for the selection. Refer section "Batch Control" for more details.

**Volume:** On touch, you can hear beep sound. Select Disable to switch off the beeper. Select value 1 to 10 for volume control. 1 is minimum sound and 10 for maximum sound

**Tool bar:** On left side of the display page, tool bar appears for configuration.

**Auto Hide:** Select 10 Sec or 20 Sec or 30 Sec or 60 Sec to hide the tool bar if user do not operate recorder via touch screen for set time interval. Select disable if auto-hide is not required on specific set time

### Scan Page:

**Idle time:** If touch screen is not operative for set idle time, then display pages in the recorder start scrolling as per defined scan rate. Select 1 to 10 Min. for the idle time if display scroll feature is required or else select disable.

**Scan Rate:** This is scroll time for the display pages. Select time interval between 5 sec to 30 sec. This time set is effective only if idle time is enabled selecting time between 1 to 10 min

### LCD:

**Brightness:** Select level between 0 and 6. 0 is lowest brightness and 6 is for highest possible brightness

**Screensaver:** To prolong the life of the LCD display, it is suggested to set the display turn-off time in 1, 10, 20, 30, 40, 50 or 60 minutes after the user operates the recorder. ***It was initially set 10 minutes for Screensaver from the factory.*** The recorder continues to record data while it is in the screen saving mode. The display turns on again by touch on the LCD screen


**Storage:** Select internal flash memory or SD card

### Custom page:

**Allow download via Ethernet:** Enable/disable

## 7.7 Security


### 7.7.1 Normal

Path:  (Menu)-More-Config-select Instrument, then press "Enter"

Select "Security" = Normal

If the normal security is selected, for different users it needs just to key in a common password in maximum 18 characters. Once the password has been entered, the user needs to key in the password whenever **Config**, **Dump**, **Clear** or **Operate** soft keys are required. These keys enable the user to do configuration, dump data, clear data or manually operate the job. For easy access **Config**, **Dump**, **Clear** or **Operate** soft keys, the user may ignore the password.

How to enter simple password

 (Menu)-More-Config, select Password, press “Enter”, then key-in the password

### 7.7.2 CFR-21

If the higher security CFR-21 is selected, it is required to operate the recorder in more restricted rules which are complied with **FDA 21 CFR Part 11**

It has time limit during operation. If hands are off from keys in predefined set time which can be selected between 1 to 20 minutes using LogOut function, the user needs to key in password again. It also offers audit trail function to record the user, the timing and what type work he was doing on the recorder before. Incorrect password and unauthorized operation will be recorded into the event list as well.

In  (Menu)-More-Config-Select **Instrument**, press “Enter” soft button.

Select Security = CFR-21.

Security Mode: CFR-21

- Logout: Disable
- Password validity: Unlimited
- Security Level of Functions
  - Login From PC: 9
  - Dump: 9
  - Clear: 9
  - Operate: 9
  - Config: 9
  - Pause: 9
  - ShutDown: 9

**LogOut:** Time selection available from 1 min. to 20 min. This selection is visible only if CFR-21 is selected

If no user operates the Paperless Recorder for the above set duration, then, current user will be logged out automatically

#### Password validity:

If it is defined as 30, 60 or 90 days valid password, then it will request the user to key in a new password, or remain the old one after 30, 60 or 90 days.

## Security levels:

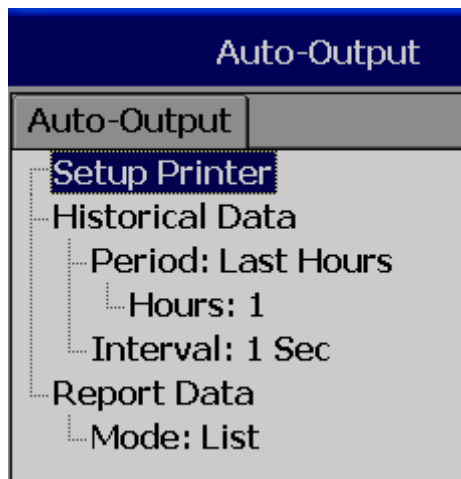
0 to 9 levels are supported

9 is the highest authority level, 0 is the lowest

## 7.8 Demo

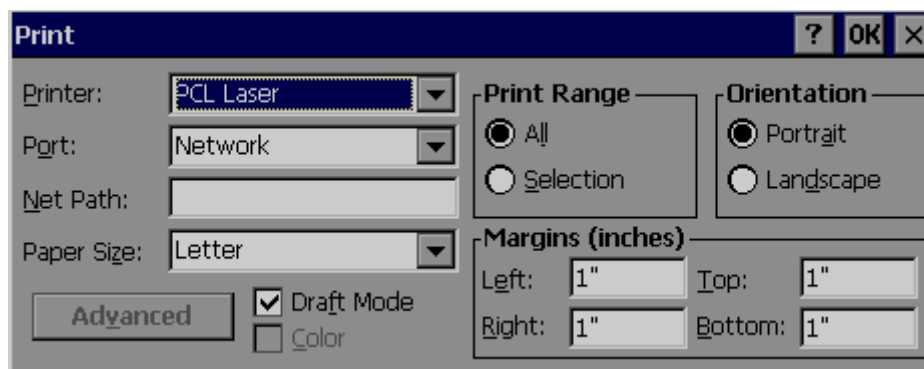
The Demo mode is a simulation mode used as a sales tool for demonstration purposes. It was set to simulate AI analog inputs and Math. *To start the automatic demonstration, first enable Demo mode, then turn the power OFF and Power ON to make it effective. To stop the automatic demonstration and return to real mode with real inputs, first disable Demo mode, then turn the power off and Power ON.*

## 7.9 Auto-Output



**SetUp Printer:** It is to configure printer

Select Setup Printer and then press “Enter” soft button



Two kinds of printers are supported. One is USB printer for page printing and another is Serial printer for Line printing

Applications: Print Historical data, events, & Reports and snapshot directly from Paperless Recorder.

### 7.9.1 USB Printer

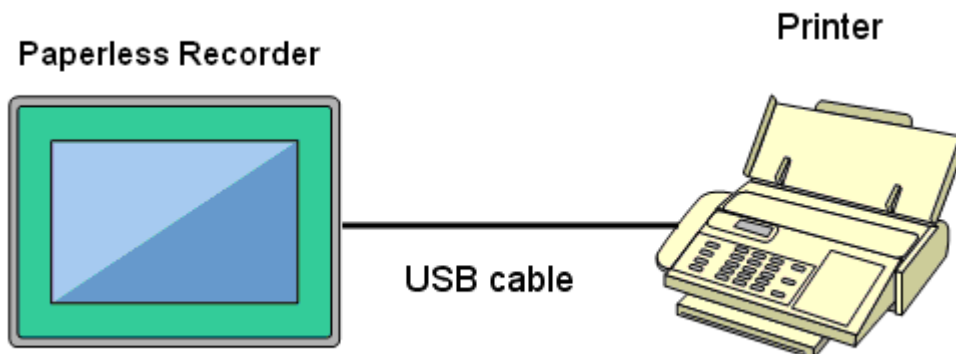
Generally, USB printer support PCL protocol. It means, it will support Page Print, but not line print. We support PCL language 4, 5 & 6

If USB printer supports ESCP protocol similar to EPSON LQ300+, then, it is possible to take line print.

Please refer Printer user manual for exact protocol details




Do not use USB printer supporting only PCL to print single line alarms, otherwise, pages will be wasted



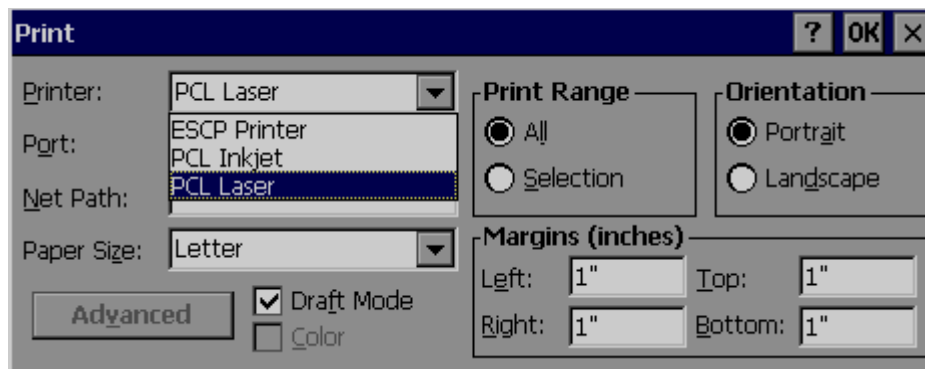
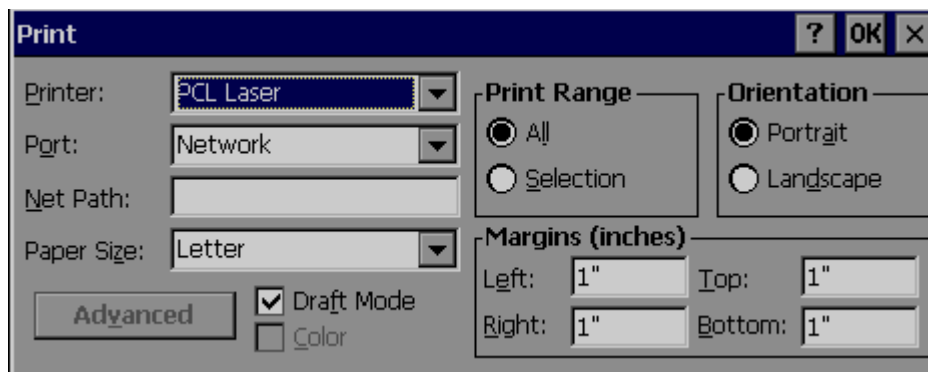
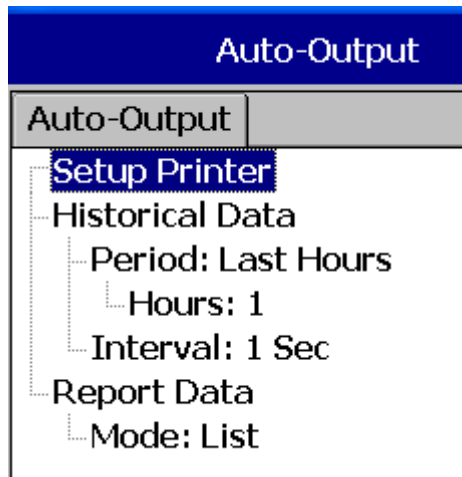
#### Procedure

Connect Recorder to Printer via USB cable

Power ON Printer

Path:  (Menu)-More-Config-Auto-Print, Enter

Select "Setup Printer", press "Enter" soft button



**Printer:** PCL Laser, ESCP printer, PCL Inkjet available by default. Select one from the list as per printer model connected to the Paperless Recorder

**Port:** It shows "Network" by default. Once Printer connected to USB port, it will show "LPT1" for the USB printer, select "LPT1"

**Net Path:** It is required to enter correct network path here only if both Printer and Paperless Recorder are connected to LAN network



**Paper Size:** A4, B5, Legal and Letter are supported

**Draft mode:** By default, it is selected. If more quality print is required, deselect Draft Mode

**Color:** Enabled for Inkjet printer

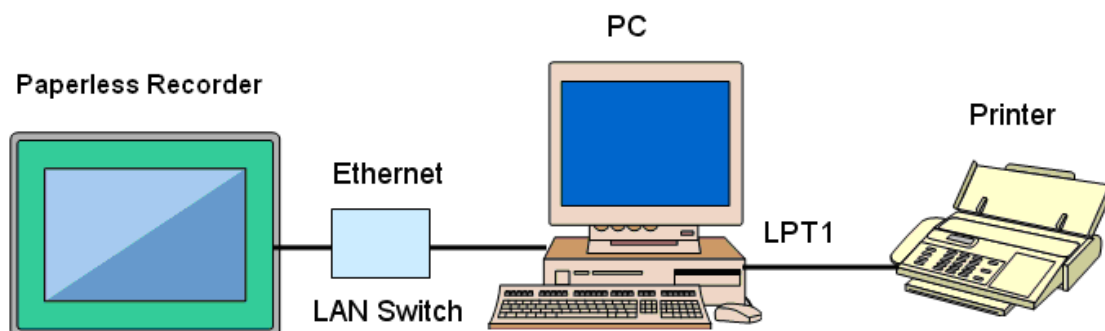
**Orientation:** Select Portrait/Landscape as per requirements

Note: Margins & Print Range are not working at this time.

Now, setup is ready at Paperless Recorder

## 7.9.2 Network Printer (LPT1)

Serial printer will print minimum one line and generally used for printing Real time alarms. Also, it can be used for printing historical data and alarms from Paperless Recorder. ESCP language supported. So, any printer supporting ESCP like LQ300+ can be used. LPT1 port of PC can be connected to Serial printer directly. However, it needs to install Printer driver in PC first and share it for network use via Ethernet.



### Procedure

Connect Paperless Recorder to PC via Ethernet

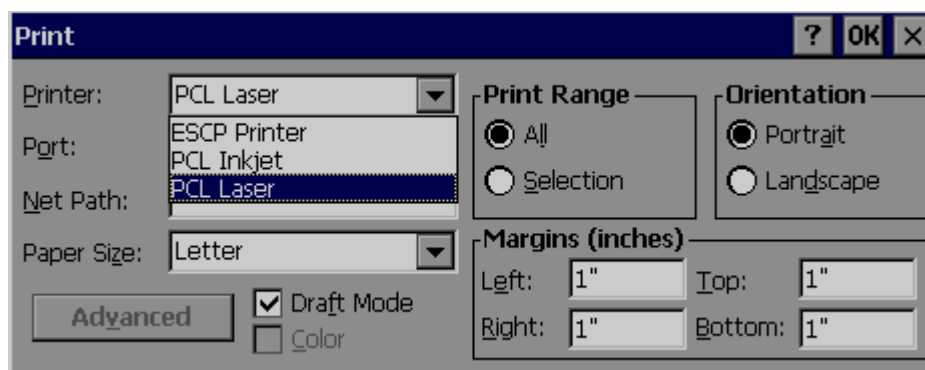
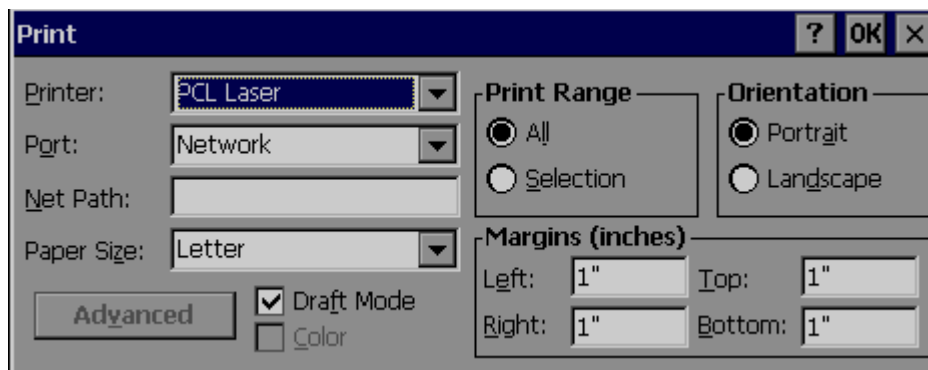
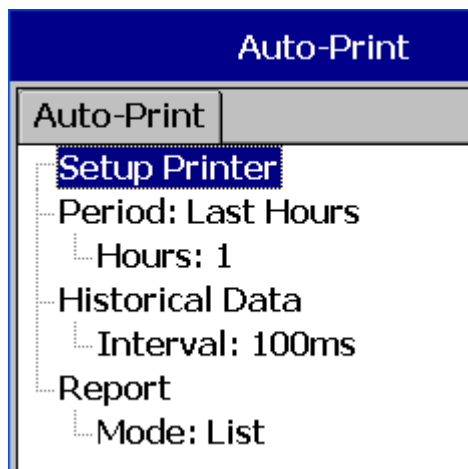
Install Printer driver in PC. Share Printer for network use

Connect Printer to PC via LPT1

Power ON Printer

In Paperless Recorder, at Path, select  (Menu)-More-Config-Auto-Print, Enter

Select "Setup Printer", press "Enter" soft button



Select ESCP printer.

Then, enter Net Path properly. Ex: \\PC1\LQ300

Where, PC1 is computer name and LQ300 is shared printer driver for network use

Now, setup is ready at Paperless Recorder

### 7.9.3 Print Historical data

Configure USB Printer or Network printer as explained in earlier section

In Paperless Recorder, at Path, select  (Menu) -More-Config-Auto-Output, Enter

Auto-Output	
Auto-Output	
Setup Printer	
Historical Data	
Period: Last Hours	
Hours: 1	
Interval: 1 Sec	
Report Data	
Mode: List	

**Period:** Select Last hours or Last days

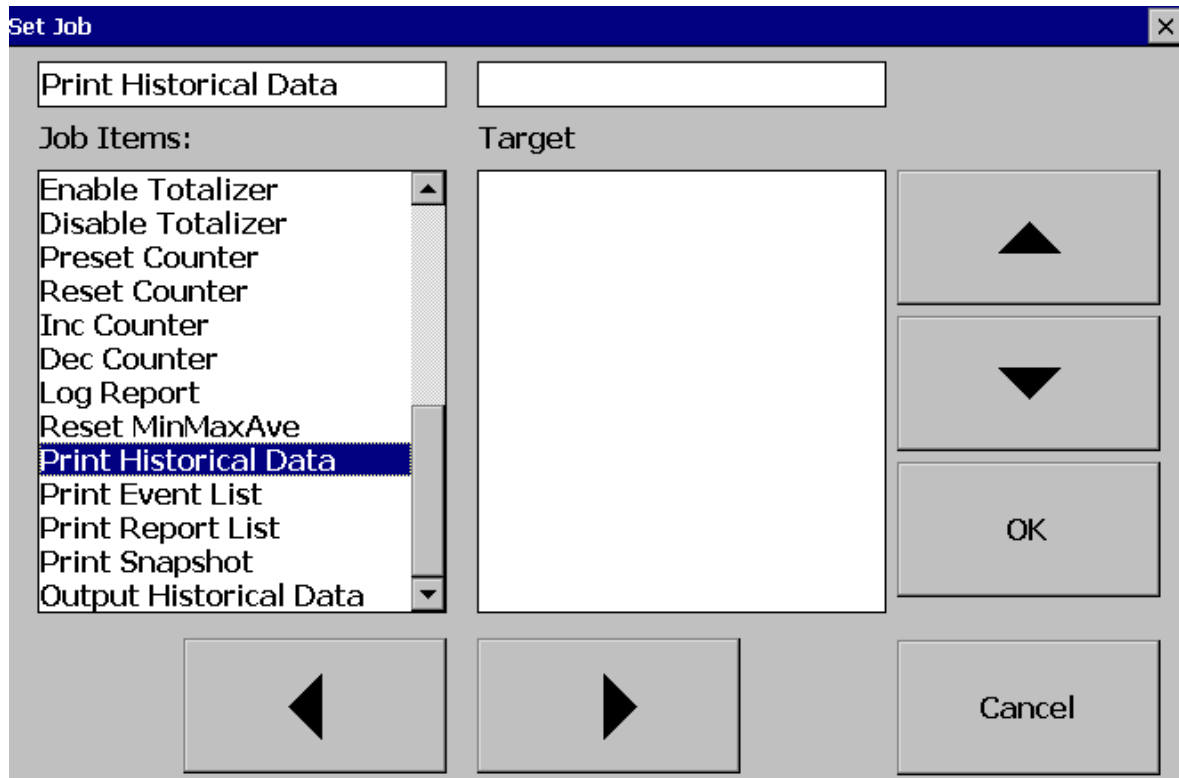
**Hours/Days:** Select no. of hours or no. of days as per above selection

**Interval:** Select intervals of 100 msec/1 sec/2 sec/ 5sec/ 10 sec/ 20 sec/ 30 sec/ 1 min/ 5 min/ 10 min.

Print function available in the Job list and it can be initiated in various ways.

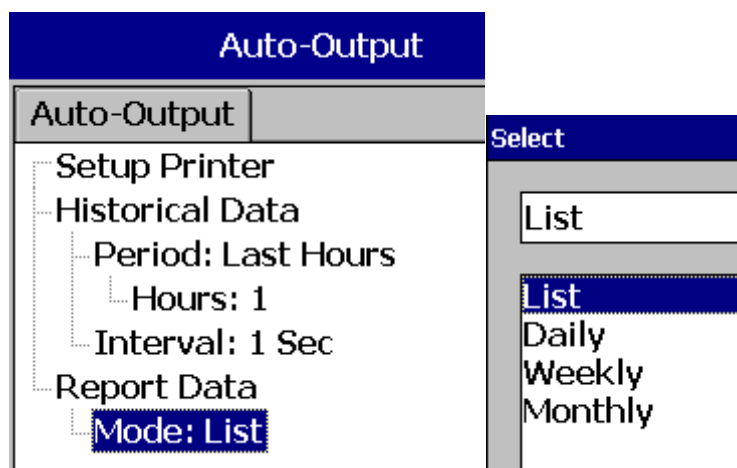
Ex: Print historical data of last 1 hr. and do this every day at 8.00 hrs

Timer					
1	2	3	4	5	6
Type: Daily					
Action: Enable					
Time					
Hour: 8					
Min: 0					
Sec: 1					
Job1: Print Historical Data					
Job2: No Action					



#### 7.9.4 Print Reports

In Paperless Recorder, at Path, select  (Menu)-More-Config-Auto-Output, Enter



In the Mode, select which kind of Reports are required. Available options include Daily Reports, Weekly Reports and Monthly Reports

Timer					
1	2	3	4	5	6
Type: Daily					
Action: Enable					
Time					
Hour: 8					
Min: 0					
Sec: 1					
Job1: Print Report List					
Job2: No Action					

## 7.9.5 Print Snapshot

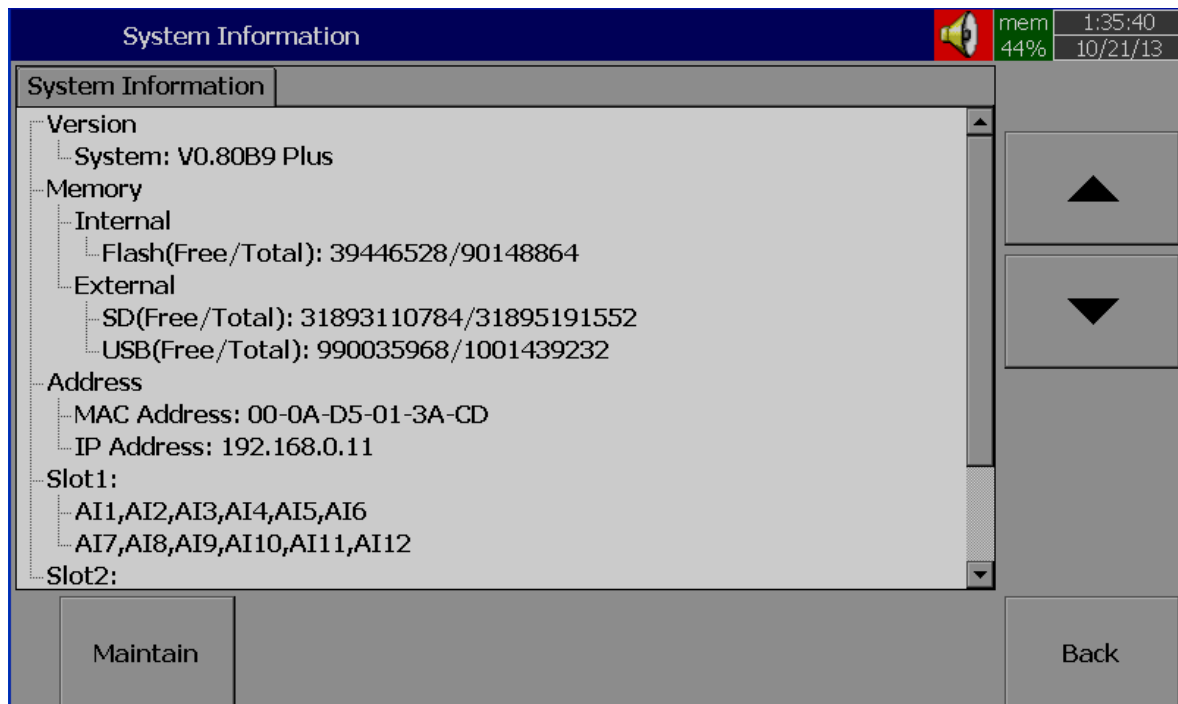
(Menu)-More-Operate-Print Snapshot


Menu	
Realtime	
Mode	Dump
Alarm	Clear
Status	Operate
History	Config
Event	Stop
More	ShutDown

Operate	
Print Snapshot	
Job Items:	Target
Enable Totalizer Disable Totalizer Preset Counter Reset Counter Inc Counter Dec Counter Log Report Reset MinMaxAve Print Historical Data Print Event List Print Report List <b>Print Snapshot</b> Output Historical Data	<div>▲</div> <div>▼</div> <div>OK</div> <div>◀ ▶</div> <div>Cancel</div>

## 7.10 System Info



Path:  (Menu)-More-Config-System Information

The system information includes System version, Internal and External memory, Ethernet IP address and Slots status

**Version:** It is the firmware version of the recorder.

### Memory (Free / Total):

**Internal:** Indicates the percentage of free memory to total memory available in internal flash card

**External:** Indicates the percentage of free memory to total memory available in external memory devices of SD and USB.

A small icon on the top right indicates the percentage of free memory e.g.: Mem 96 %

### Address:

**MAC:** Display MAC address of Paperless Recorder

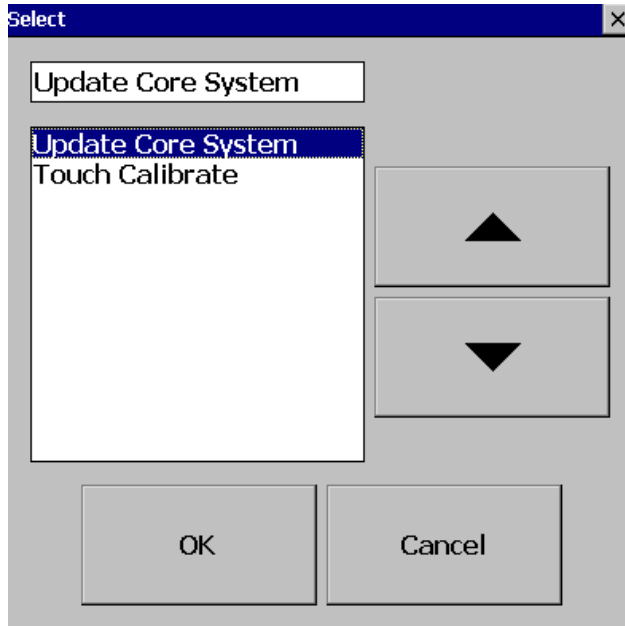
**IP address:** Display IP address for the Paperless Recorder

**Slot 1..5:** Indicates the status of all Slots and the cards been inserted in. The cards include Analog Input AI, Digital Input DI and Digital Output DO & AO.

- **Upgrade Firmware**

Path:  (Menu)-More-Config-System Information-Maintain

**Maintain:** The Maintain button is located at left lower side in System Info. page. It is the button to upgrade the firmware and Calibrate touch screen in paperless recorder



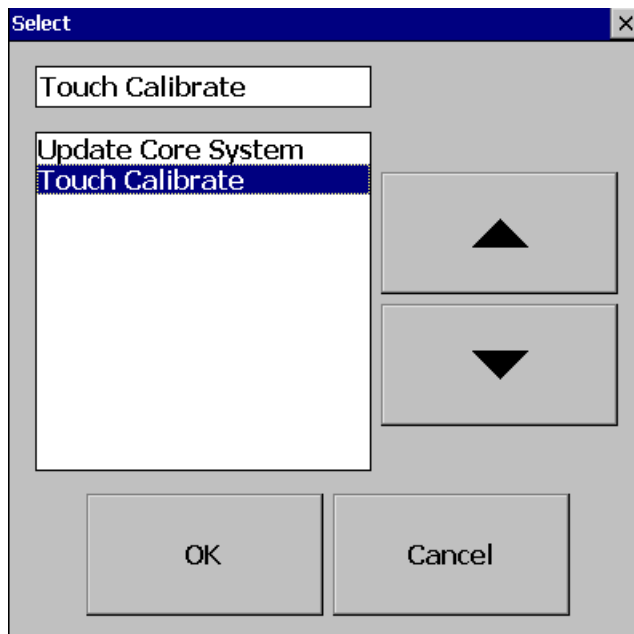
**Upgrade Core System:**

This is to upgrade firmware in paperless recorder. Contact factory/supplier for latest firmware files. Please download firmware file first to USB stick, then, insert USB stick at USB port at Paperless Recorder. Select 'Update Core System' and then click on "OK" button. It may take a few seconds to finish the process. Please note that power supply should be not switched off during this upgrade process

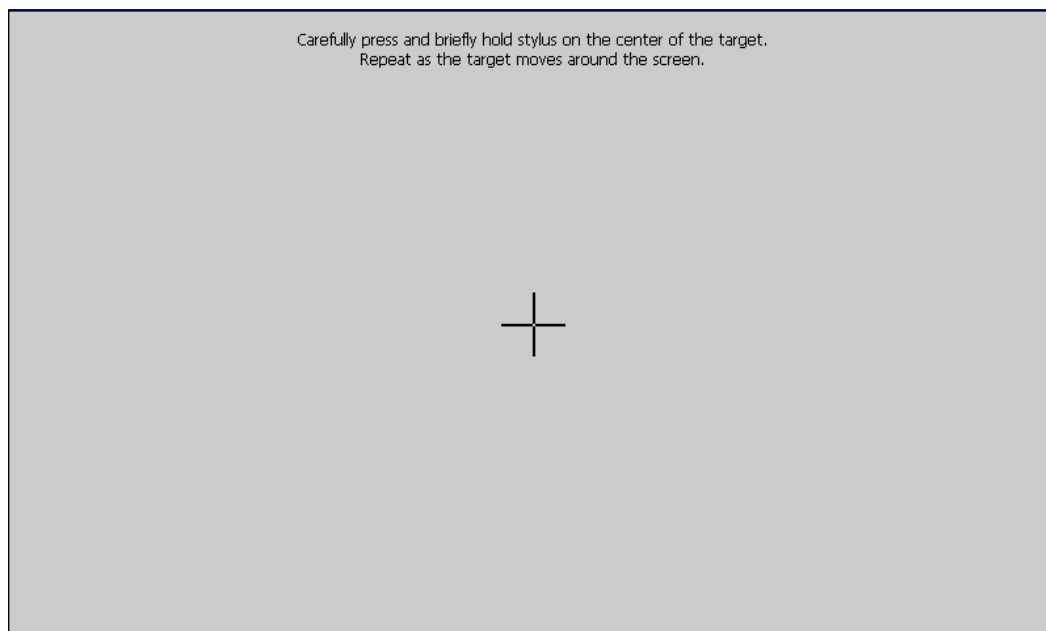
- **Calibrate Touch Screen**

Path:  (Menu)-More-Config-System Information-Maintain

**Maintain:** The Maintain button is located at left lower side in System Info. page. It is the button to upgrade the firmware and Calibrate touch screen in paperless recorder



This is to calibrate the touch screen. A “+” symbol appears in the center of the LCD screen. Carefully press and briefly hold stylus on the center of the target. Repeat this procedure as the target moves around the screen. Just touch the screen to complete the screen calibration. This procedure helps to locate pointer via touch screen and properly select the objects during operation of the recorder



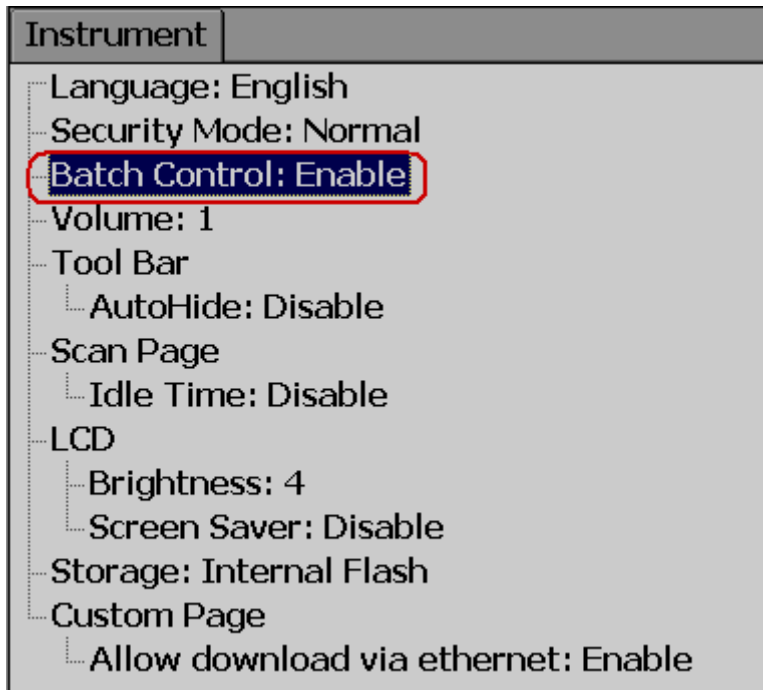
## 7.11 Batch Control

This feature is to store data in different folder for every batch and archive data later with reference to a batch.

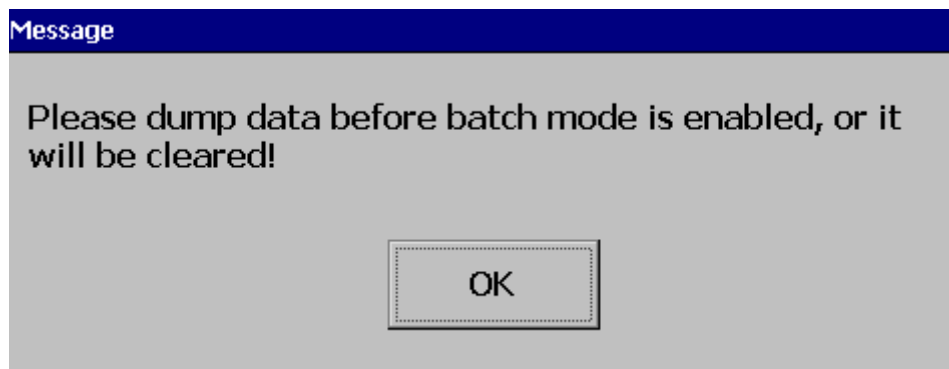


Path:  (Menu)- More-Config- Instrument


Select Batch Control and press “Enter” key. Select “Enable”. Press “Ok”

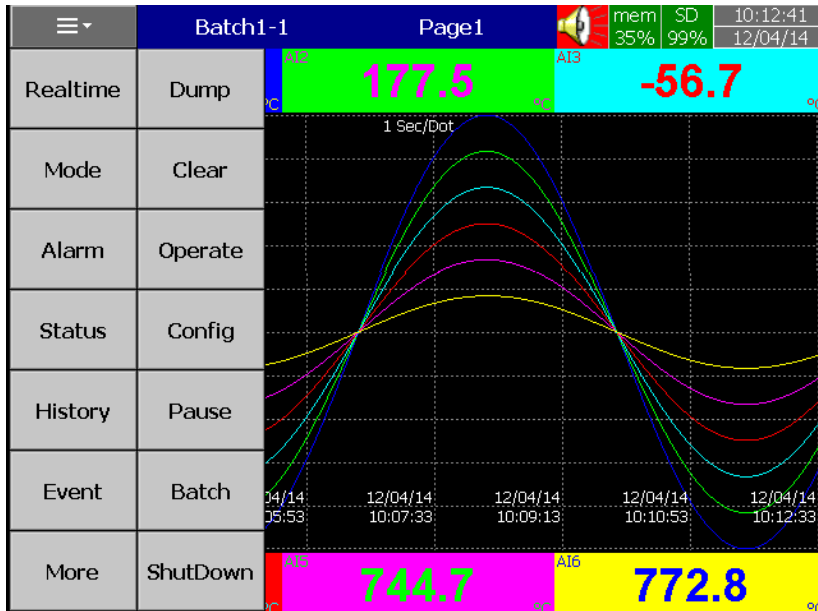


Press “Back”



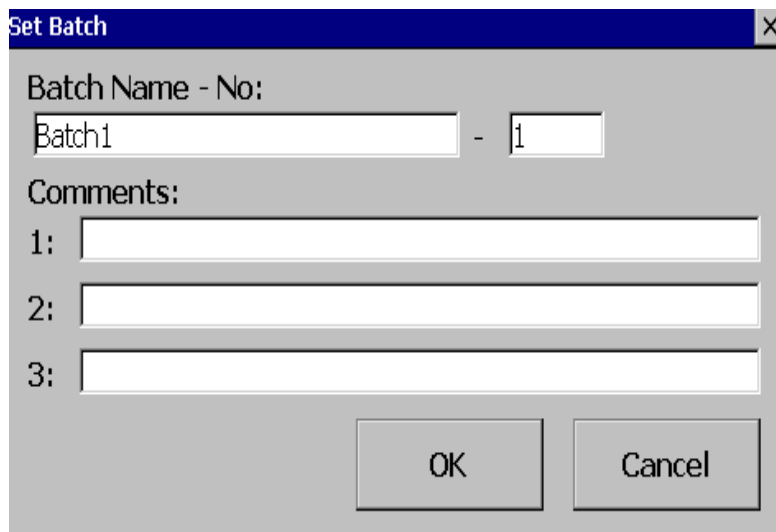
Press “OK”, then, press “Home” Soft key to save these settings

After Power ON, Then in the  (Menu), Batch soft key will be shown as below



Note: “Batch” soft key will appear only after Batch Control enabled as explained above


Press on Batch and it shows the following screen

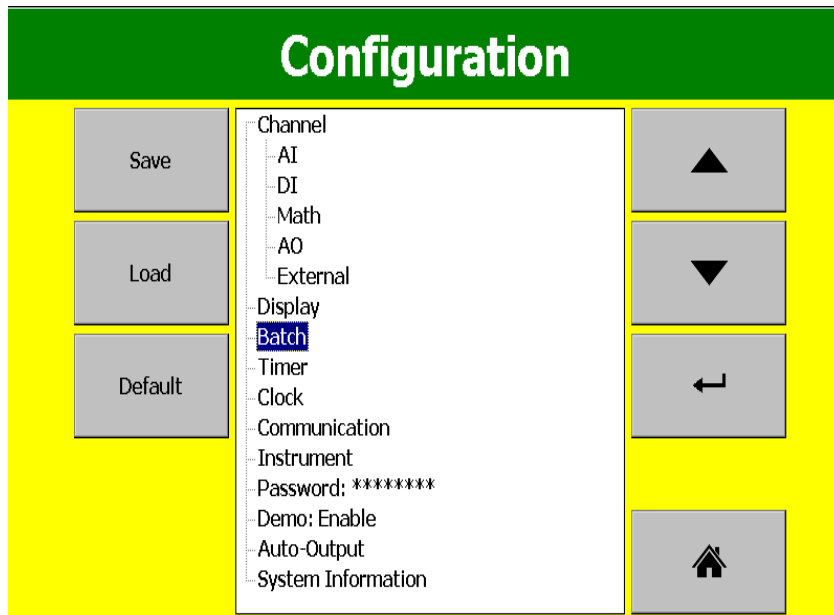


The 'Set Batch' dialog box contains the following fields and buttons:

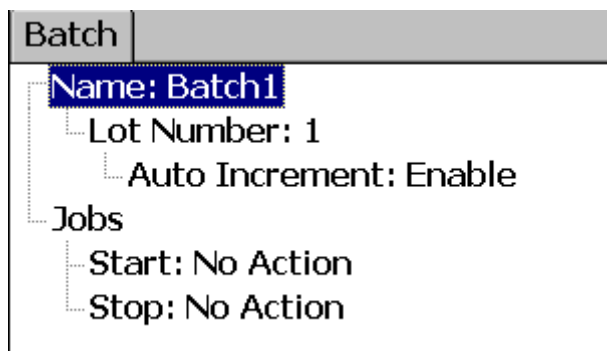
- Batch Name - No:** A text field containing 'Batch1' followed by a hyphen and a numeric field containing '1'.
- Comments:** Three numbered text input fields (1, 2, and 3).
- Buttons:** 'OK' and 'Cancel' buttons at the bottom.

Operator can enter maximum three comments for any batch.

In the  (Menu)-More-Config, select “Batch”, press “Enter” key



It will show the Batch control settings as shown below



**Name:** Enter Batch name. Maximum 18 characters are allowed. By default, it's Batch1


**Lot Number:** Enter the Lot number. If Auto increment is enabled, then Lot numbers will be incremented automatically by the recorder say Batch1-1, Batch1-2, Batch1-3 etc.. during every start of a new batch

**Jobs:** Two events, Start, Stop are available

**Start:** Start means Jobs that should be done during start of a new batch


**Stop:** Stop means Jobs that should be done during stop of a batch

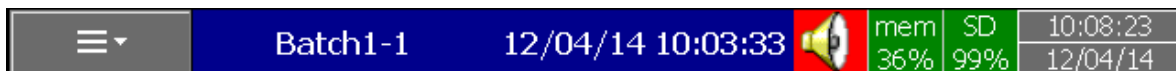
**Note:** When batch control is enabled, then recorder will be in Pause mode by default initially and it requires Starting of the recorder from the Menu by pressing at

 (Menu)- More than “Start”. When recorder is not logging any data, Pause status shall be shown in the Top right area of the recorder as shown below



## How to do the batch control

Press on  (“Menu”) , “More”, then “Start”. Batch number will be shown in the recorder Top area.



To Stop this batch, press on “Menu”, “More”, then “Pause”. It gives a message “Saving data” and updates batch data in the internal memory of the paperless recorder.

### ● Batch Example-1

Operator wants to start a batch every day at 8.00 hrs and stop the batch at 12.00 hrs.

## Configuration

### Timer1

Type: Daily	Action: Enable
Time – Hour: 8	Min: 0    Sec: 1
Job1: Start	
Job2: No Action	

### Timer2

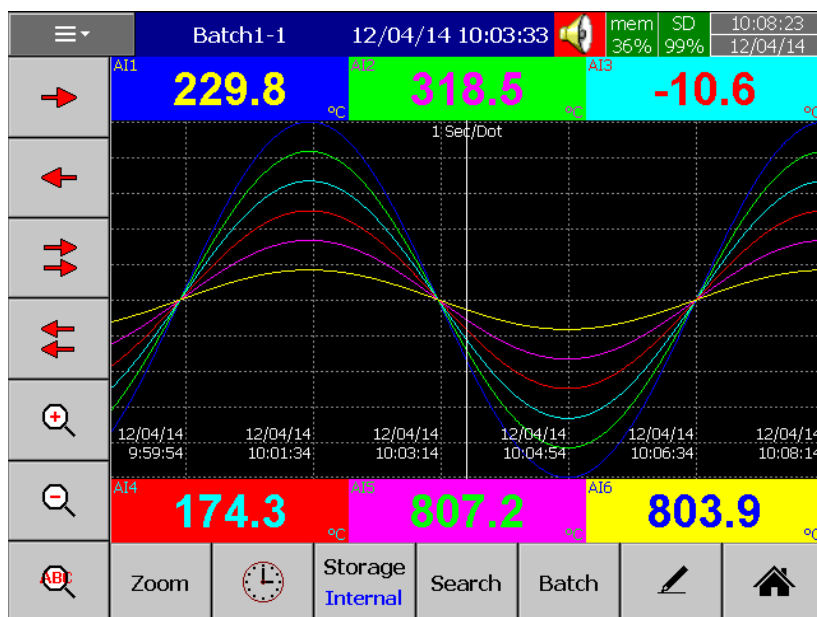
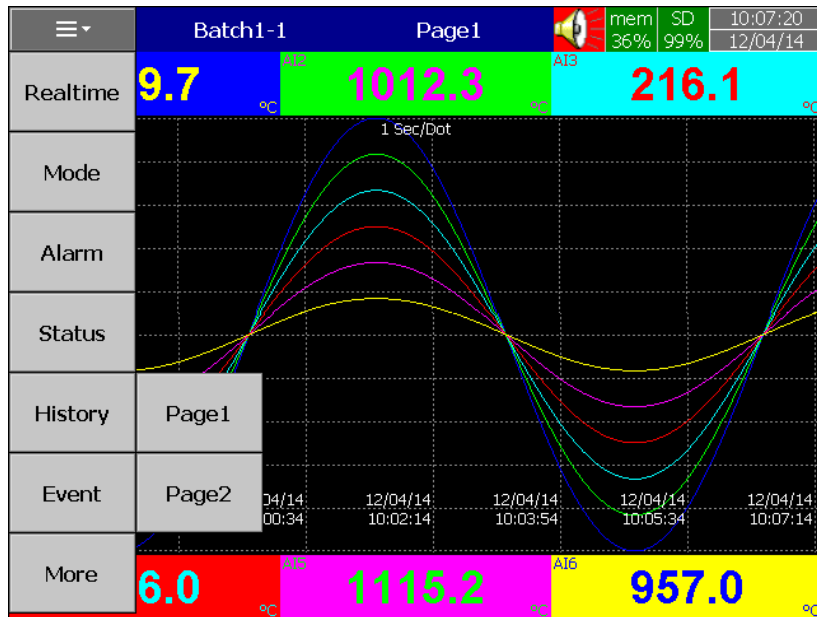
Type: Daily	Action: Enable
Time – Hour: 12	Min: 0    Sec: 1
Job1: Pause	
Job2: No Action	

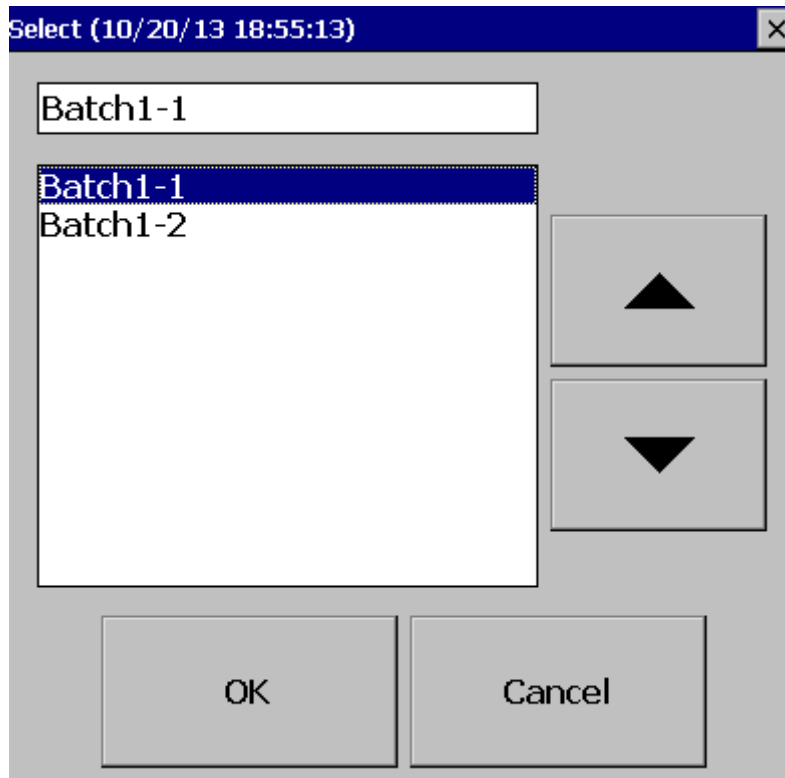
## How to view batch data in Recorder ??

Press on  (Menu)-History-Page1


Press “Search”, select required Batch and press “Ok”

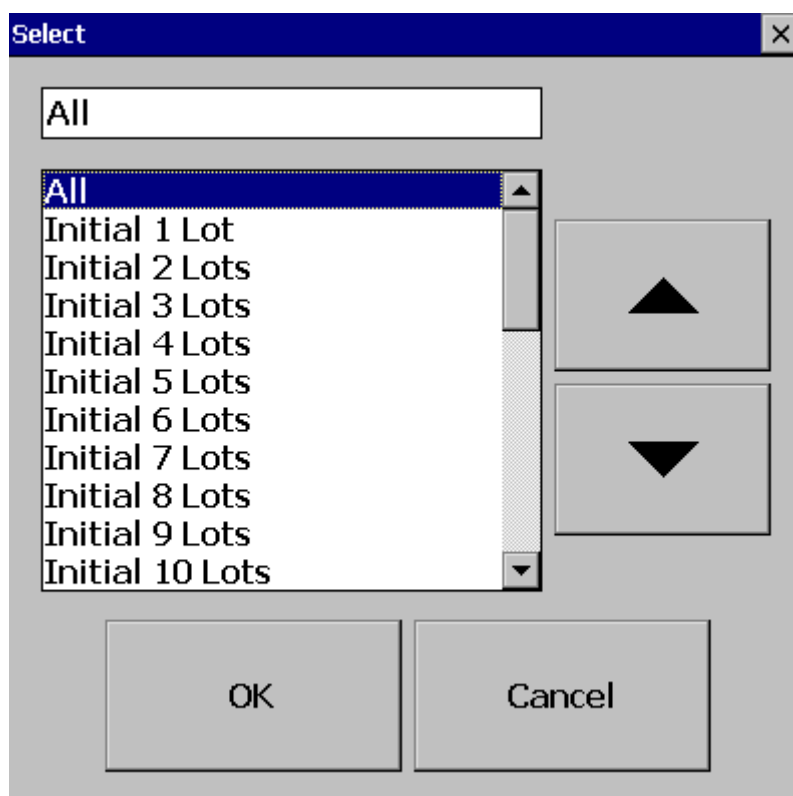
Batch details including lot number can be archived by pressing soft key “Batch”





## How to Dump Batch data to external USB memory

Press on  (Menu)-More then press on Dump



Select "All" or required lots and press "OK"

For ex: Batch1-1, Batch 1-2, Batch1-3 are available

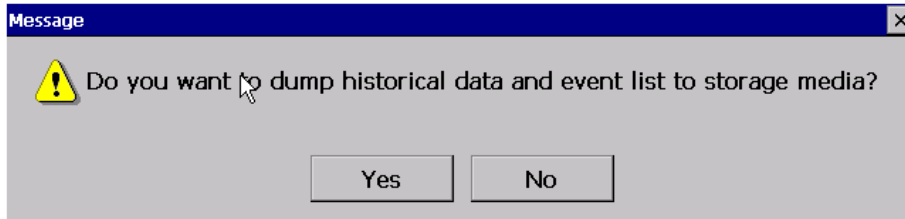
Initial 1 Lot means, Batch1-1

Initial 2 Lots means, Batch1-1 and Batch1-2

Initial 3 Lots means, Batch1-1, Batch1-2 and Batch1-3

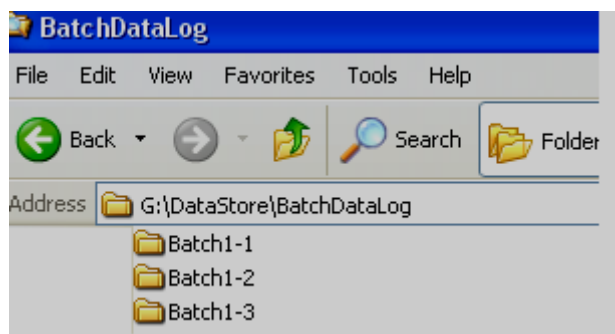
Note: Provision not available to dump only specific lot.

Please refer Instrument->Data Transfer-> Transfer and Remain



Press on "Yes" to dump data from internal memory to external SD Card or USB memory.

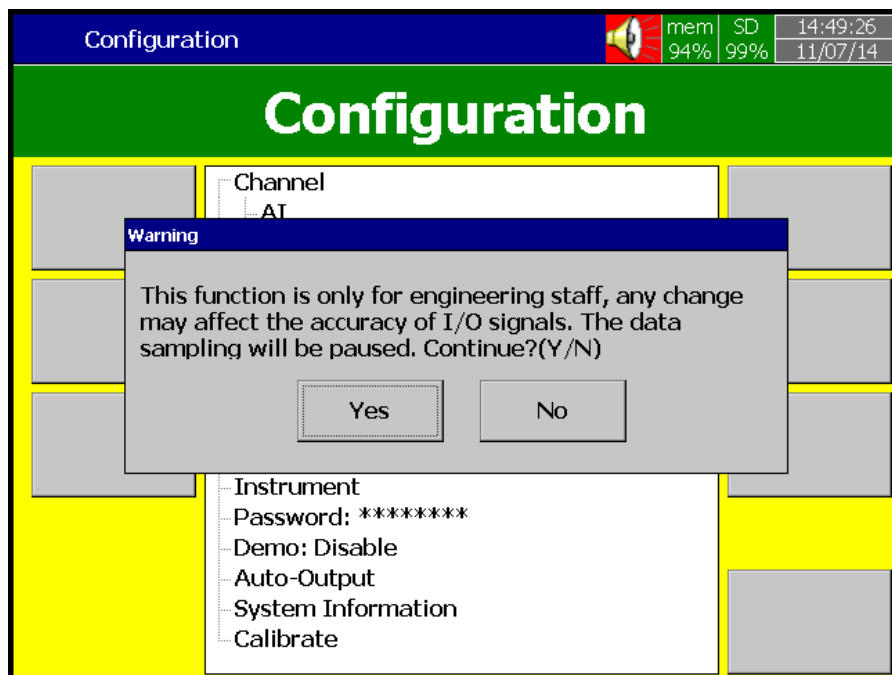
If you have 3 batches say Batch1-1, Batch1-2 and Batch1-3, then you can see three different folders in the external USB memory card after completing of dump



Please note that the data available in USB memory is in proprietary format to avoid any kind of tampering and you need PC software to view this data.

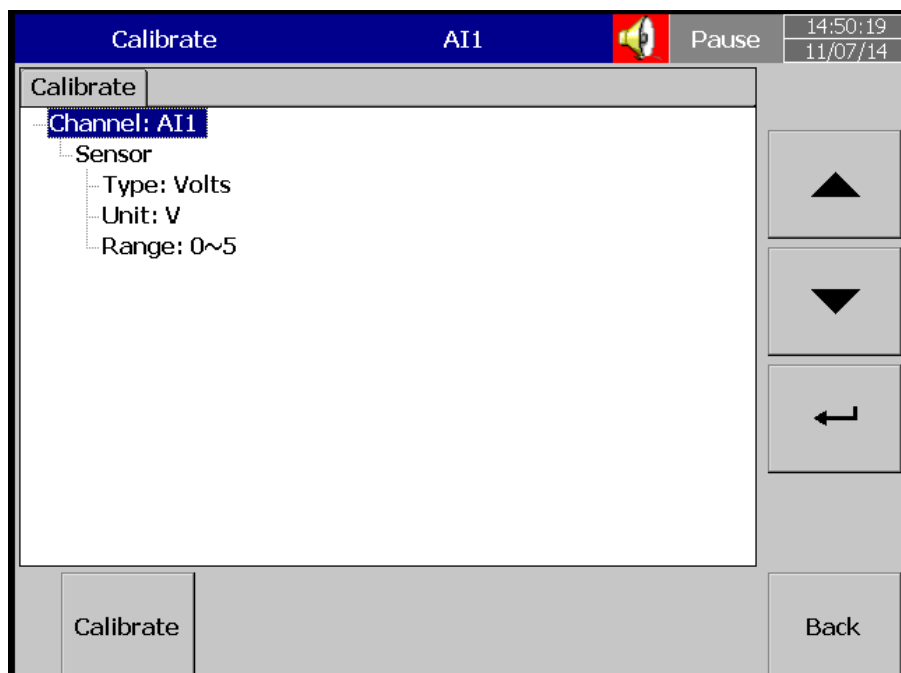
## 7.12 Calibrate

This function is used for calibrating Individual Analog channel.



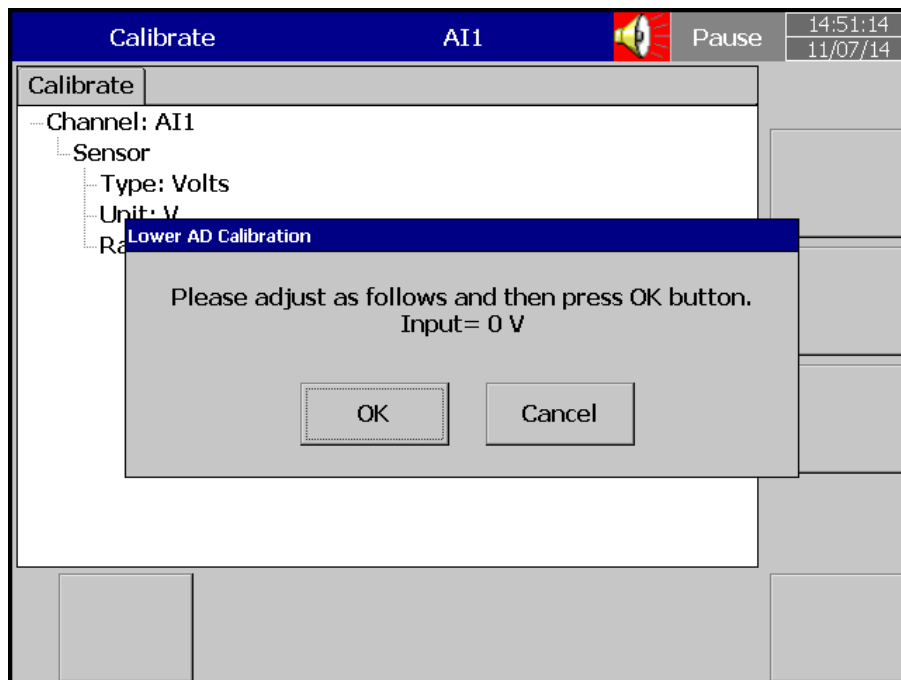
For Eg:

If you are calibrating an AI (0-5V). When you click Calibrate menu, User can see the below screen. Then please click calibrate as shown in the below screen

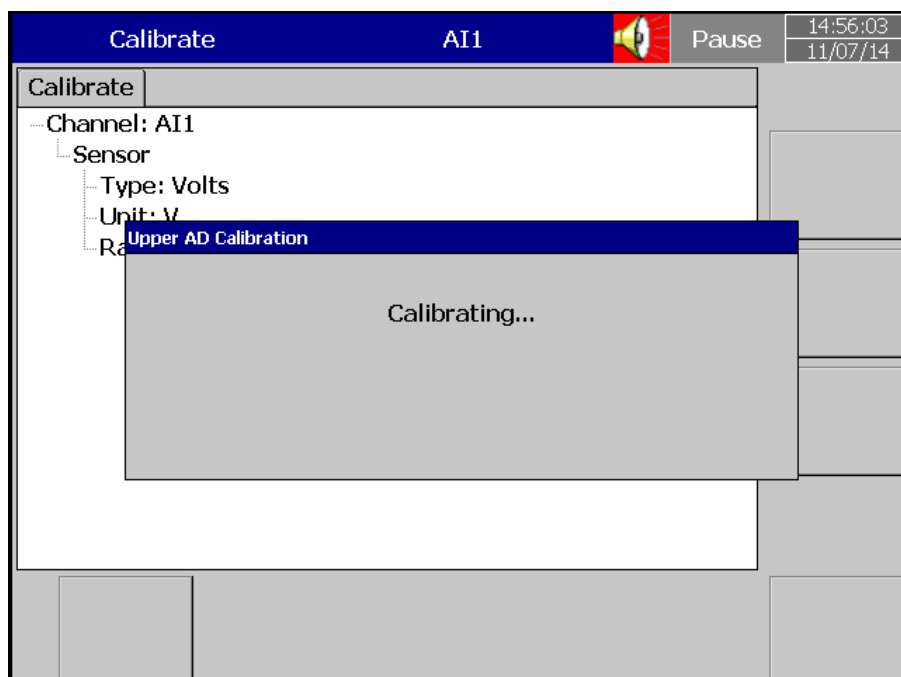




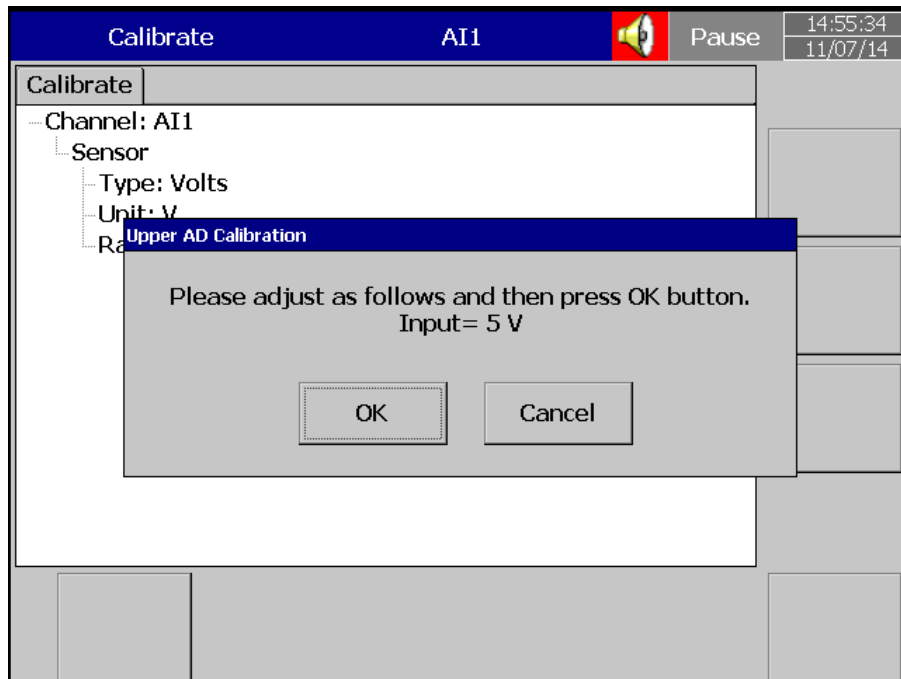
Please follow the next instruction, inject 0V in to the input which can be seen in below screen



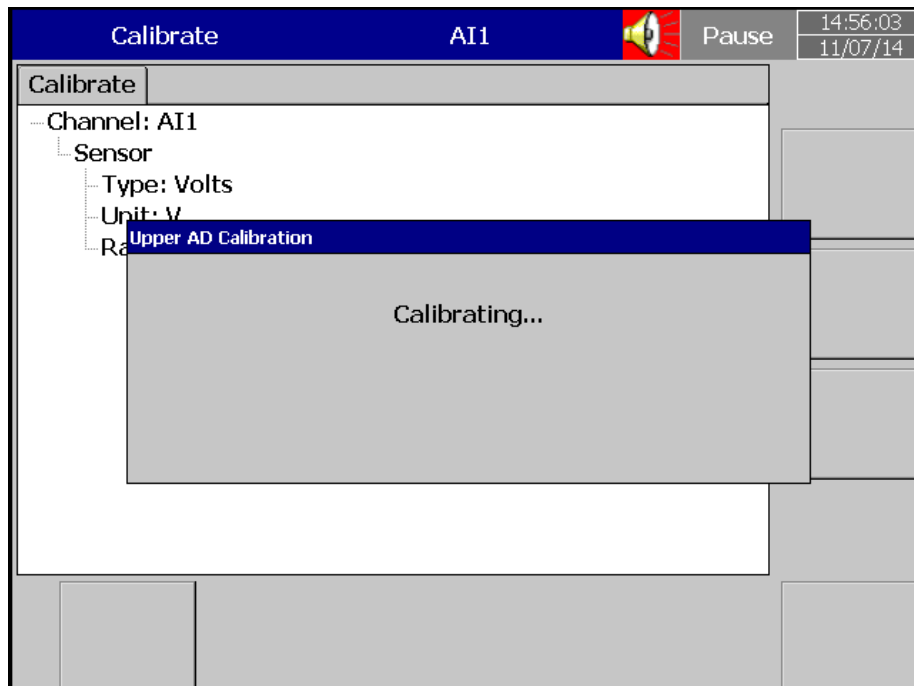
After you inject and select ok, User can see the below screen  
Now follow the next instruction



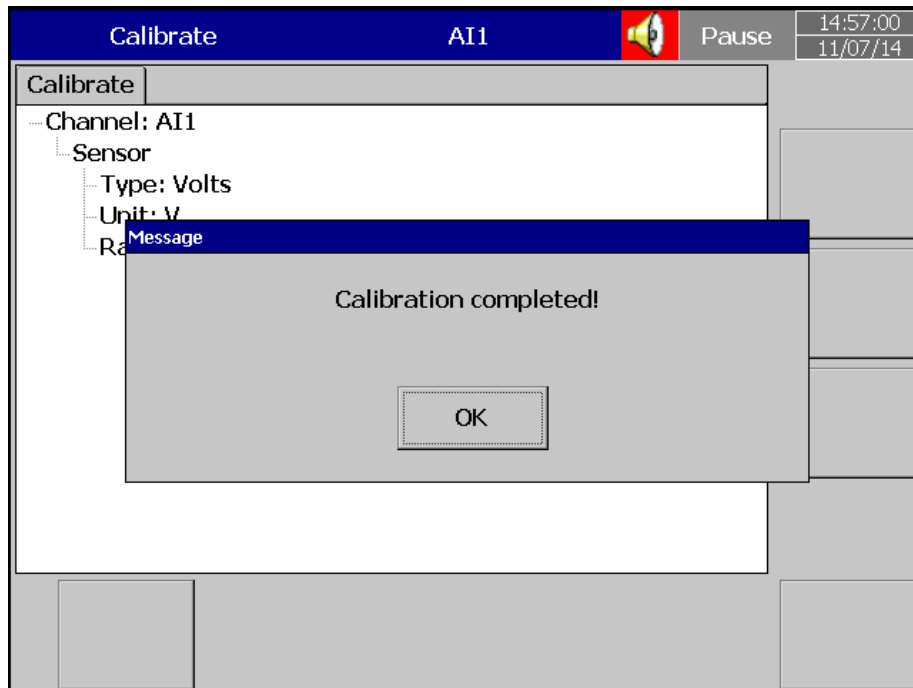
Now inject 5V and click ok



After you inject and select ok, user can see the below screen  
Now follow the next instruction



When the calibration is done successfully, the user can see below screen.



## 8. PC based software

By using this software you can configure the settings of the Recorder offline and online. Trends of configured channels can be viewed in PC by using this.

This has got 4 Options:

### 8.1 Free Basic Software

#### 8.1.1 Requirements

##### Hardware

Recommended hardware

PC with 2 GHz processor, 1GB RAM

50GB free space in the hard disk.

Ethernet port, RJ 45 female/ USB port


Minimum 20% free space in hard disk, Less than 10% space generates error message

### 8.1.2 Operating system

Windows based Operating systems, Windows XP, Windows 7, Windows 8 etc..  
32 bit and 64 bit operating systems are supported

### 8.1.3 Software

Software installation

1. Install latest dotNet software from Microsoft website
2. Install the software
3.  Historical viewer icon desktop shortcut will be created after installation of software
4. Historical viewer can be accessed from the following path as well
5. Start-Programs-Historical viewer-Historical viewer.

The Software contains:



HIST\_VIEWER is for monitoring historical trends and also for configuration of recorder parameters in PC.

### Uninstall the free Software

This is to remove previous versions of free software from PC.


### HIST\_VIEWER



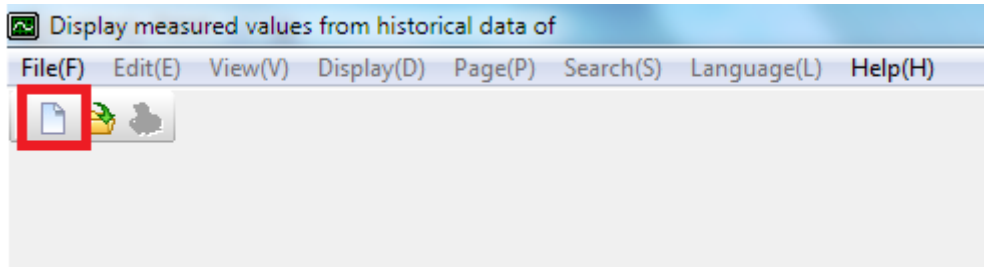
On how to set configuration of the Recorder from PC.

Start-Programs-Historical Viewer

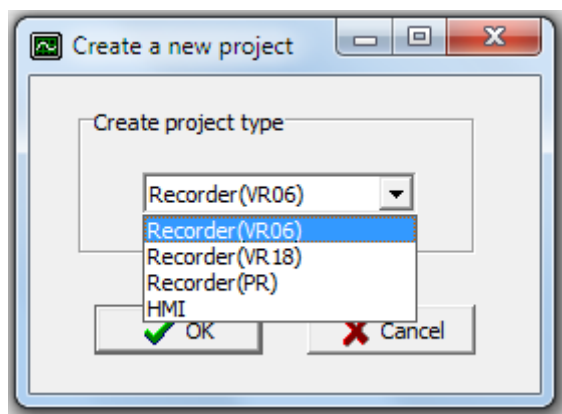
Tool bar

 To open new project

 To open existing project file

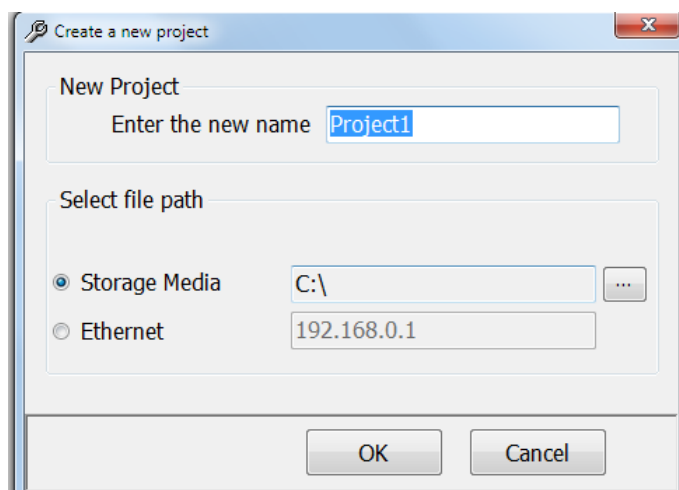


When the User clicks the icon new ( shown in the above picture, squared), they can view the below menu, and accordingly they can select the Recorder (PR) and click ok.

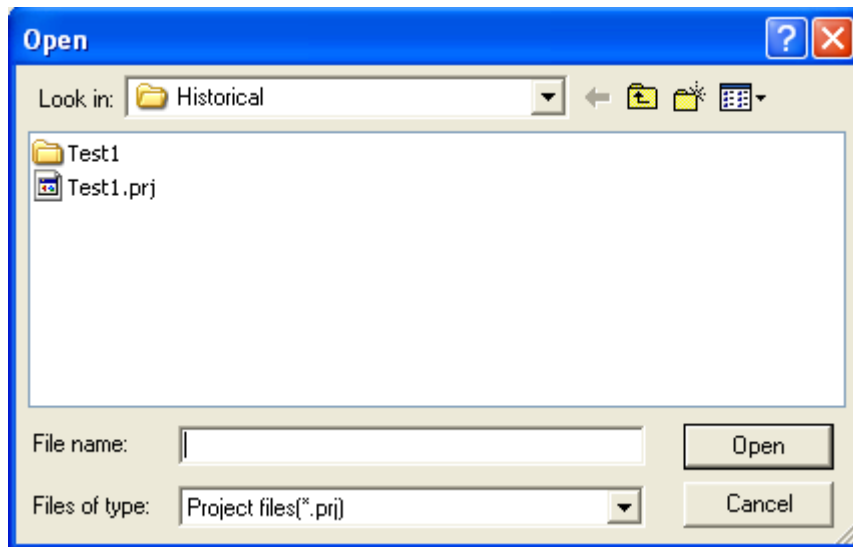


After that User has to give a name to the project and select the location of project ( as shown in the below figure). If the user has already got the configuration in a SD card or USB , they can select the path accordingly.

If the User for the first time wants to configure the Recorder, then they have to select Ethernet, and enter the correct IP address of the Recorder.




If the User wants to open file in the software, already configured in the PC, then they can select \*.prj file to open the project.



 To save the project file settings in PC

 Receive configuration (Storage Media/Ethernet)

 Send configuration (Storage Media/Ethernet)

If the software is already configured in the PC, then you can select \*.prj file to open the project.

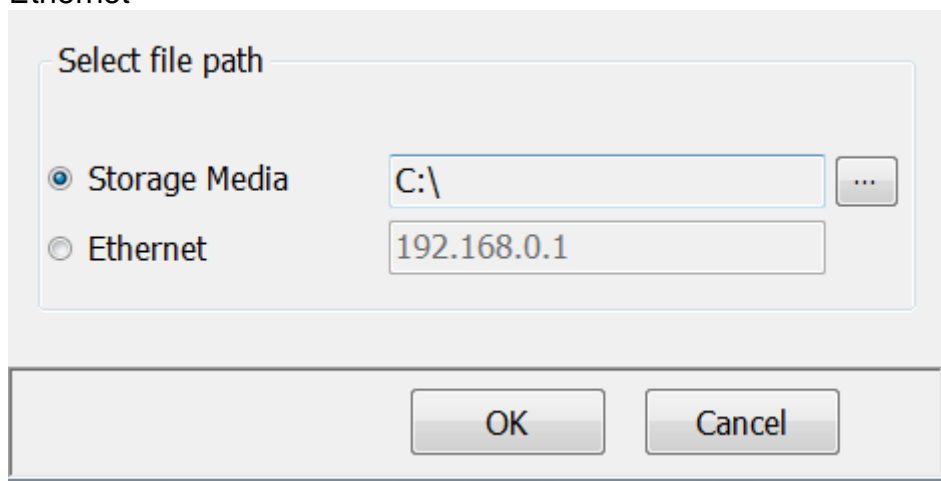
## Bank

This is used to select physical connection between the Recorder and PC.

Two options are available:

Storage Media

Ethernet



Standard Ethernet port (RJ 45 female) shall be available at the Recorder. RS 232/RS485 shall be supplied as additional options.

#### 8.1.4 Ethernet Configuration

It is possible to use PC software for data logging of Recorders connected on standard Ethernet. Maximum 1024 tags can be configured for data logging, archiving and analysis. The tags cover AI, Math, DI, DO, Counter & Totalizer.

1. Make sure that network adapter in PC is properly configured. IP address, Subnet mask and Gateway should be configured at the PC for using Observer II program. Please contact System administrator to set Unique IP address for the PC.
2. Install Observer II application software in PC. The software may be installed from setup available in the CD supplied as per the order.
3. Ethernet configuration at Recorder

Please refer to **4.5 Communication** for entering IP address, subnet mask and gateway address manually at the Recorder.

Gateway refers to a device on a network that sends local area traffic to other networks.

Subnet mask numbers help to define the relationship between host and rest of the network.

For every LAN, the Network administrator shall define Subnet mask and Gateway. Obtain subnet mask and gateway address for the LAN at the place where the Recorder to be connected. Enter these details at the Recorder manually using front buttons.

By default, subnet mask address: 255.255.255.0

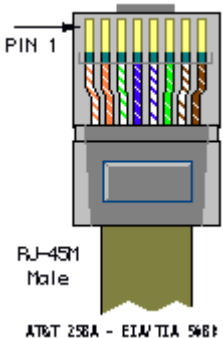
By default, Gate way: 0.0.0.0

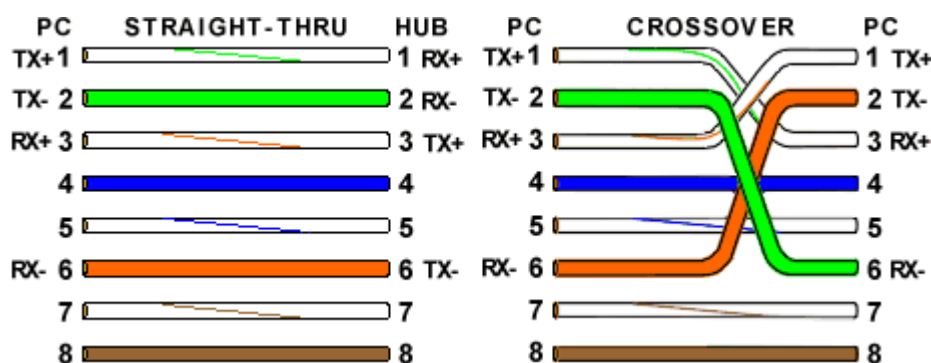
Allocate the Unique IP address to the Recorder and enter IP address at the Recorder manually. Contact System administrator for obtaining free IP address available at user LAN. Naming duplicate IP address may disable the communication between the Recorder and PC/LAN HUB.

4. Local area network uses UTP cable for Ethernet connectivity. Maximum UTP cable distance between the Recorder and LAN/HUB/PC should be less than 100 Meters. If the distance is more than 100 Meters, additional LAN accessories/equipments may be required for increasing signal

strength. Please contact network administrator for more information on extending LAN.

- Two different types of cables shall be used for connecting the Recorder on Ethernet as follows. For connecting the Recorder to LAN HUB, then standard straight-through Ethernet cable should be used. For connecting the Recorder to PC/Notebook directly, then crossover Ethernet cable should be used.

Straight Through Cable VR18-LAN/HUB			Crossover Cable VR18-PC/Notebook	
RJ-45 PIN	RJ-45 PIN		RJ-45 PIN	RJ-45 PIN
1 Tx+	1 Rc+		1 Rx+	3 Tx+
2 Tx-	2 Rc-		2 Rc-	6 Tx-
3 Rc+	3 Tx+		3 Tx+	1 Rc+
6 Rc-	6 Tx-		6 Tx-	2 Rc-



- Connect proper UTP Ethernet cable as per the requirements and observe the communication status between the Recorder and PC/LAN HUB at the LED's dedicated for the purpose near female RJ 45 connectors.

Recorder side

Link (Green LED)

Green lit: Cable connected between the Recorder and PC/LAN HUB

Green Off: No Link between the Recorder and PC/LAN HUB

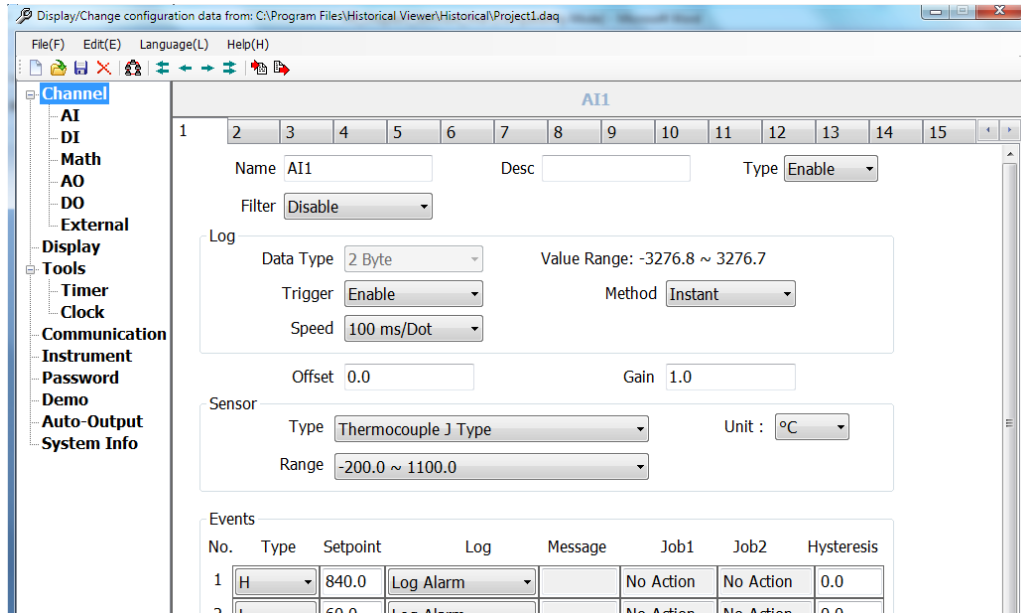
Tx/Rx

Orange Lit continuous: No cable connection

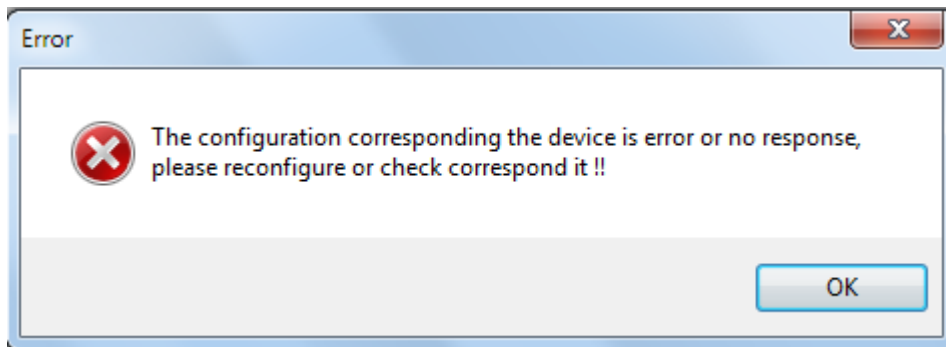


Orange slow blink: Communication established between Recorder & PC/LAN HUB

If the download is successful, the User can see the below screen.



If Upload is unsuccessful, it shown message as “No response from Recorder, connection fails”.



If this is the case, please check the Ethernet cable connections at both the Recorder and PC/LAN HUB side. Also make sure that green communication LED available for proper firm connection at RJ 45 connector.

If still communication is not established between the Recorder & PC, then once again check Subnet mask and gateway address at the Recorder & PC. Contact Network/ System administrator for proper Ethernet configuration of the Recorder & PC. Please note that Recorder should have unique

IP address in the network and PC being used for Observer II shall have separated Unique IP address in the network.

## **8.2 Data Acquisition Studio Software**

### **8.2.1 Requirements**

#### **Hardware**

Recommended hardware

PC with 2 GHz processor, 1GB RAM

50GB free space in the hard disk.

Ethernet port, RJ 45 female/ USB port

Minimum 20% free space in hard disk, Less than 10% space generates error message

### **8.2.2 Operating system**


Windows based Operating systems, Windows XP, Windows 7, Windows 8 etc..  
32 bit and 64 bit operating systems are supported

### **8.2.3 Software**

#### **Software installation**

6. Install latest dotNet software from Microsoft website
7. Install Data Acquisition Studio software



Historical viewer icon and Real time viewer icon , desktop shortcut will be created after installation of software

Historical viewer can be accessed from the following path as well  
Start-Programs-Historical viewer-Historical viewer

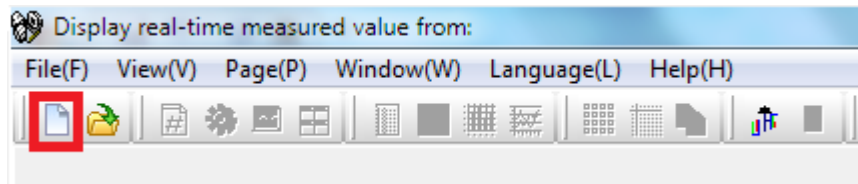
Real time viewer can be accessed from the following path as well  
Start-Programs-Data Acquisition StudioStudio- Realtime viewer

## 8.2.4 How to configure Communication Bank

It is to set path for the data transfer. It's important to setup "Bank" properly at the firsthand to proceed further

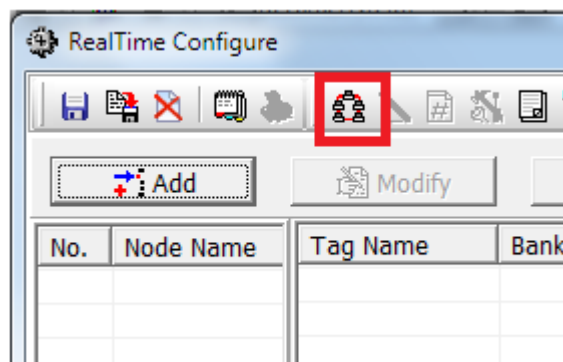
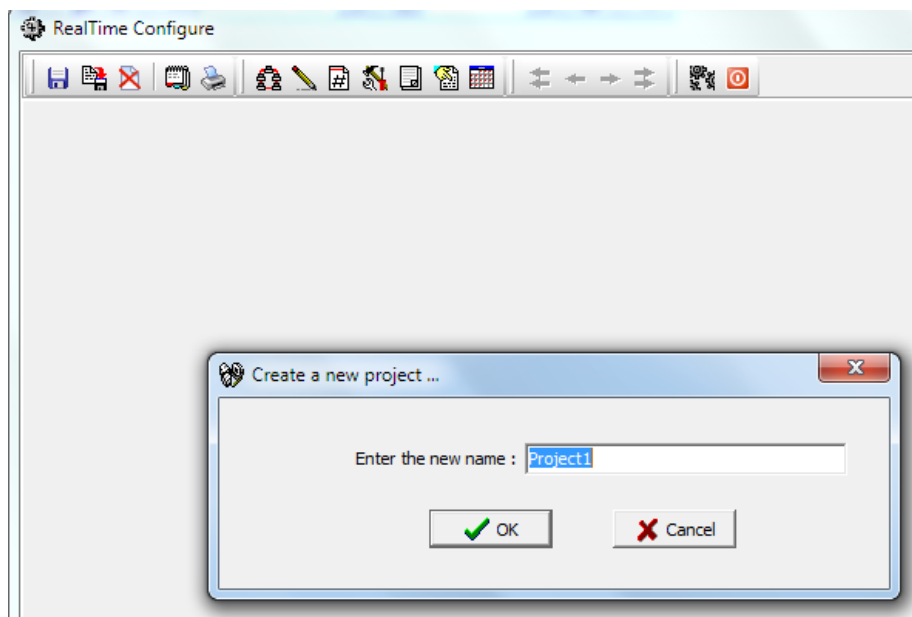
1. Open existing Project or create a new project from RealTime viewer using one of the following options

Start-Programs-Data Acquisition Studio-Realtime Viewer

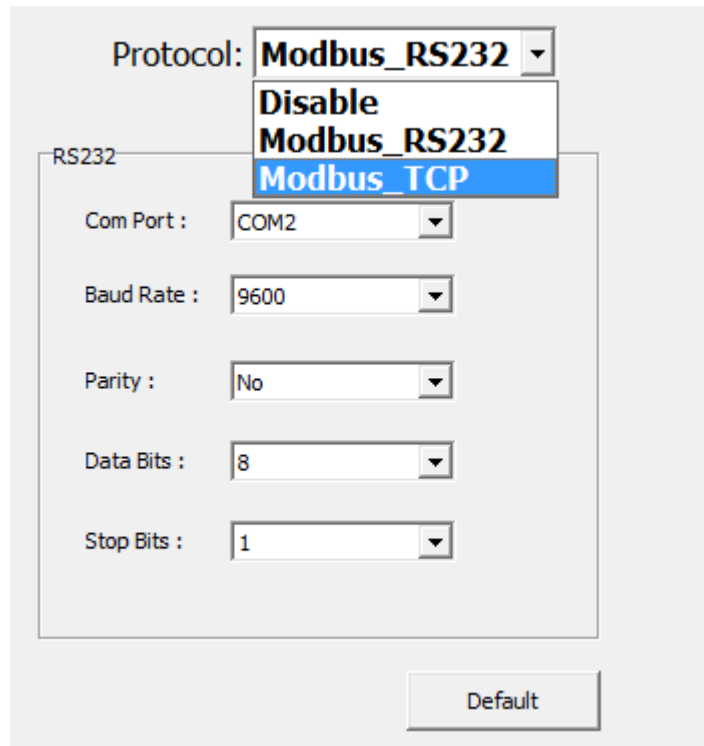


Click on new Project as shown in square icon in the above figure

Then the User has give name to the project as shown in the below figure



Click at bank icon  to open communication bank configuration, and select the bank bank accordingly.



Protocol: **Modbus\_RS232** ▼

Disable  
Modbus\_RS232  
**Modbus\_TCP**

RS232

Com Port : COM2 ▼

Baud Rate : 9600 ▼

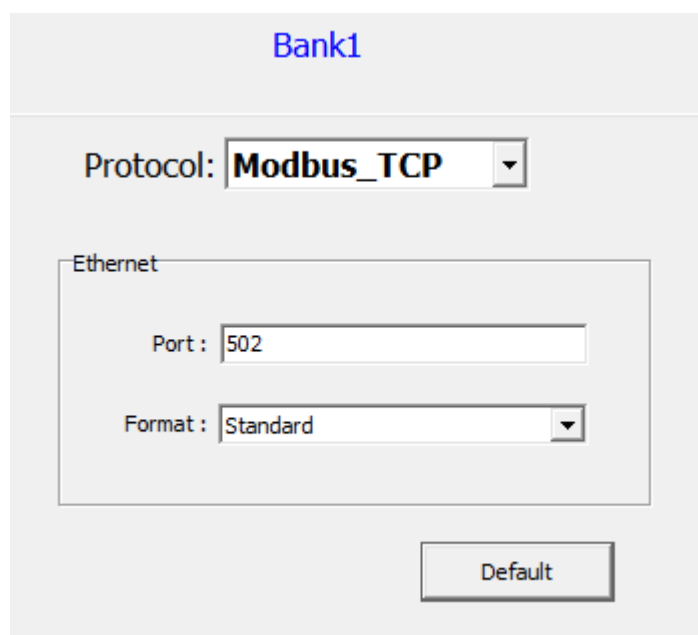
Parity : No ▼

Data Bits : 8 ▼

Stop Bits : 1 ▼

Default

If Recorder is connected to Ethernet, then select Modbus\_TCP as shown below



**Bank1**

Protocol: **Modbus\_TCP** ▼

Ethernet

Port : 502

Format : Standard ▼

Default

If Recorder is connected on Serial RS-232 or RS-485, then select Modbus\_RS232 as shown below. Please select the com port , baud rate as in the instrument.

The screenshot shows a configuration window titled "Bank1". Inside, there is a "Protocol:" dropdown menu set to "Modbus\_RS232". Below this is a section labeled "RS232" containing several dropdown menus: "Com Port:" set to "COM2", "Baud Rate:" set to "9600", "Parity:" set to "No", "Data Bits:" set to "8", and "Stop Bits:" set to "1". At the bottom right of the RS232 section is a "Default" button.

## 8.2.5 How to configure Recorder

Three ways

Touch screen, Software and Storage Media.

## 8.2.6 Touch Screen

It is possible to configure Recorder directly from Touch screen

Press Menu-Config

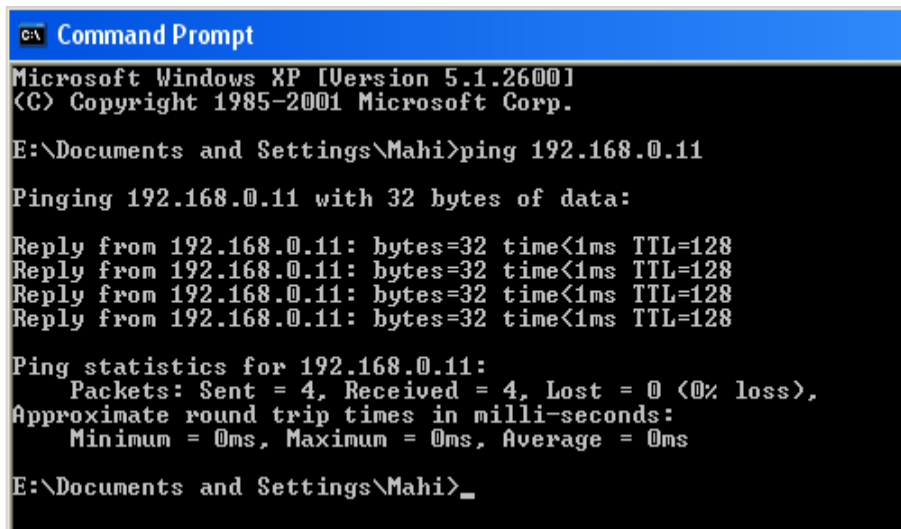
The screenshot shows a "Configuration" screen with a blue header bar. Below the header is a green bar with the word "Configuration" in white. The main area has a yellow background. On the left, there are three buttons: "Save", "Load", and "Default". In the center, there is a list of configuration options: "Channel", "AI", "DI", "Math", "AO", "External", "Display", "Timer", "Clock", "Communication", "Instrument", "Password: \*\*\*\*\*", "Demo: Enable", "Auto-Output", and "System Information". On the right, there are four buttons: an up arrow, a down arrow, a left arrow, and a home icon.

Please refer chapter 4 for more details

## 8.2.7 Ethernet

The steps are given below

1. Connect Recorder to PC via cross over or straight Ethernet cable
2. Check IP address of your Computer. Make sure to set IP address of Recorder in same domain as your PC  
For ex: IP address of your computer: 192.168.0.200  
You may set IP address of Recorder as 192.168.0.11
3. Procedure to set IP address manually at Recorder  
Menu-More-Config-Communication, press "Enter"  
IP = Select User Define  
Select, IP address: 192.168.0.11 (Default) and press "Enter" to change if required  
Subnet mask: 255.255.255.0  
Default Gateway: 192.168.0.1
4. Use Ping from DOS prompt and check communication is ok or not. If no response, then, check cable or IP address at your computer or IP address at computer



```

C:\> Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.


E:\Documents and Settings\Mahi>ping 192.168.0.11


Pinging 192.168.0.11 with 32 bytes of data:

Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

E:\Documents and Settings\Mahi>_
  
```

5. Double click at Realtime viewer icon  at desktop and follow on screen instructions to create a new project

Note: Create a new project only if it's first time. Next time onwards, you can open  the saved project available in your computer

**Auto-configuration**

Device Type: Recorder(PR) Bank: 1

Protocol: Modbus\_TCP ☒ Auto-update the Tag conte

LogSpeed: 1 Sec/Dot LogMethod: Instant

**IP address**

Example: 192.168.0.25  <----- Please key in IP here and then press '+' button to add it to the IP list.

IP List: 192.168.0.119

<----- Please select one IP form IP List and then press '-' button to remove it.

**Use Converter**

☐ Use Converter:Device Node address From: 1

☐ Set node range To: 1

**Select Display Tag**

☐ 1,PV

☐ 2,PV and SV

☒ 3,PV, SV and MV

If the connection is working fine, the user can see the below figure. Upon clicking the icon shown you are accepting the configuration

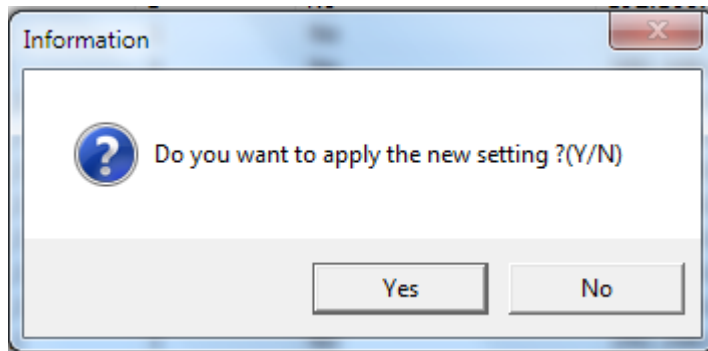
**RealTime Configure**

Icons: [Save] [Load] [Print] [Help] [Refresh] [Add] [Modify] [Delete] [Accept] [Cancel]

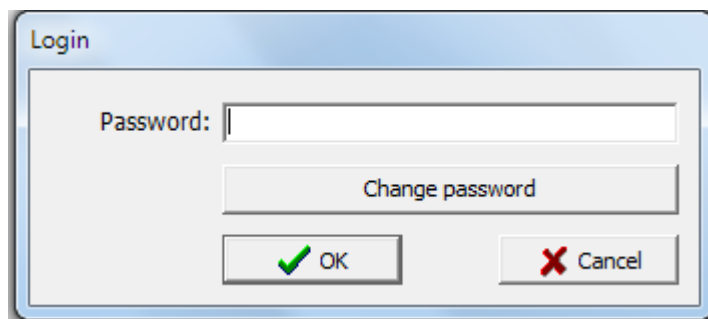
Buttons: Add Modify Delete

No.	Node Name	Tag Name	Bank	Use Converter	Node/IP	Device T
1	All List	AI1_1	1	No	192.168.0.219	Recorder
	Recorder(PR..	AI2_1	1	No	192.168.0.219	Recorder
		AI3_1	1	No	192.168.0.219	Recorder
		AI4_1	1	No	192.168.0.219	Recorder
		AI5_1	1	No	192.168.0.219	Recorder
		AI6_1	1	No	192.168.0.219	Recorder
		AI7_1	1	No	192.168.0.219	Recorder
		AI8_1	1	No	192.168.0.219	Recorder
		AI9_1	1	No	192.168.0.219	Recorder
		AI10_1	1	No	192.168.0.219	Recorder
		AI11_1	1	No	192.168.0.219	Recorder

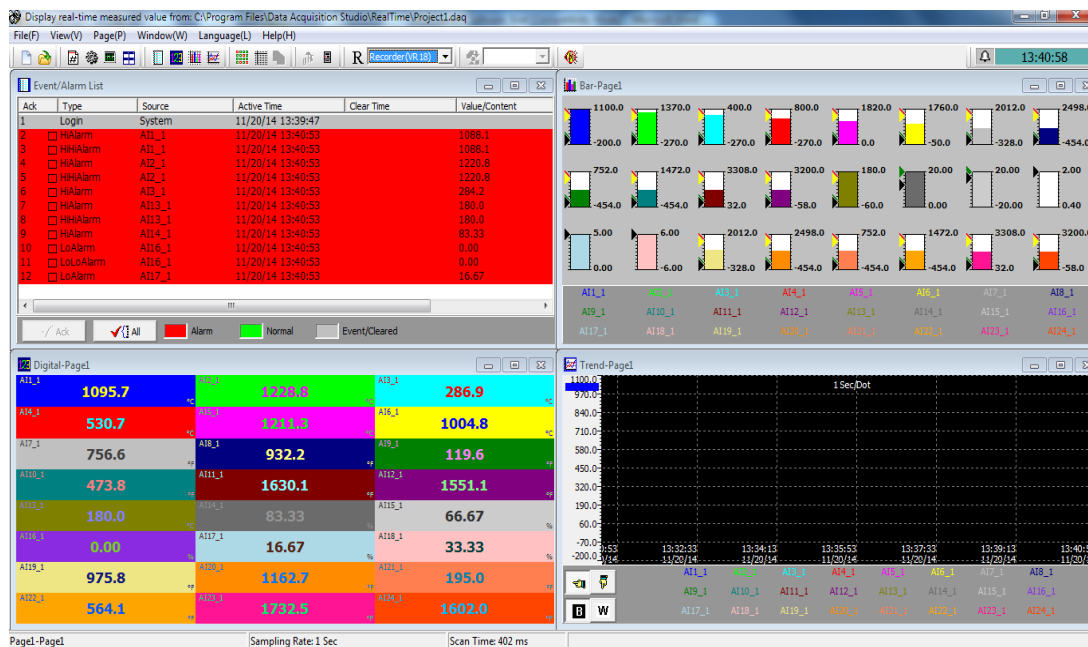
Click yes to apply the settings.



If you have set no password just click ok



And after that you can see the below figure

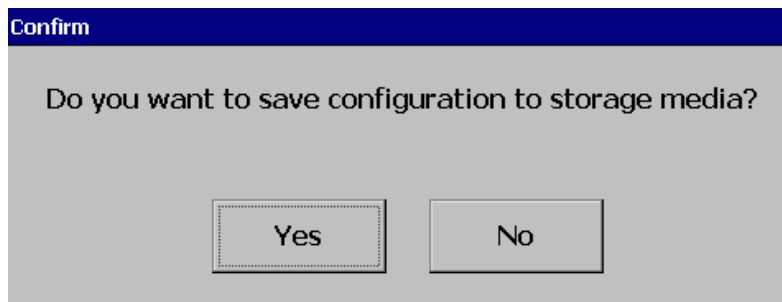
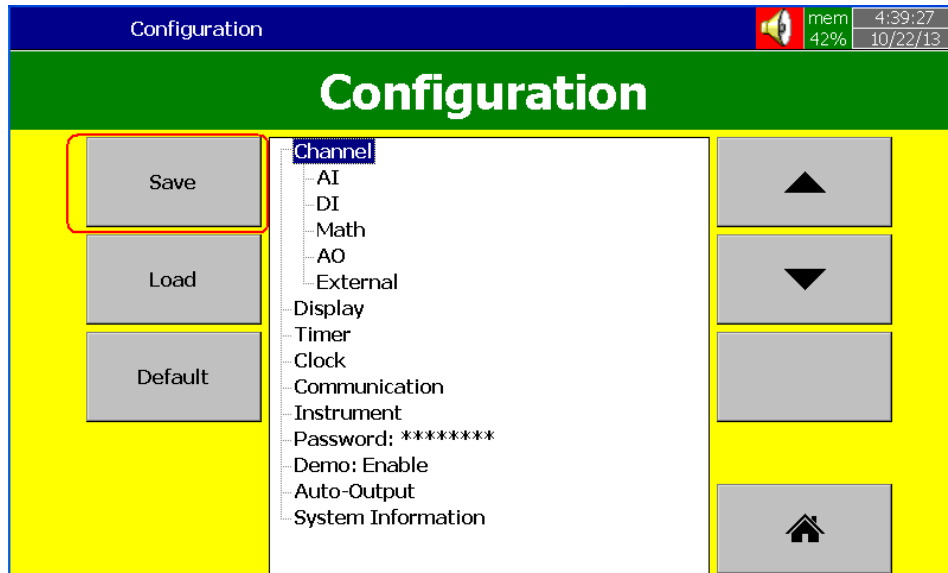


## 8.2.8 Removable Media



The steps are given below

1. In Recorder, pl. insert empty SD card or USB stick
2. In Recorder, press “Menu-More-Config”. Press “Save”

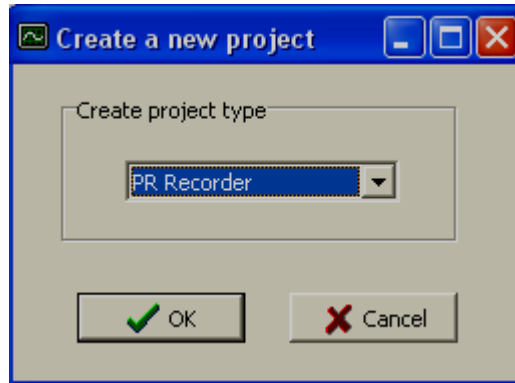


Press “Yes”. It will save Recorder configuration files into USB stick.

Check contents of Removable media. It should have following files

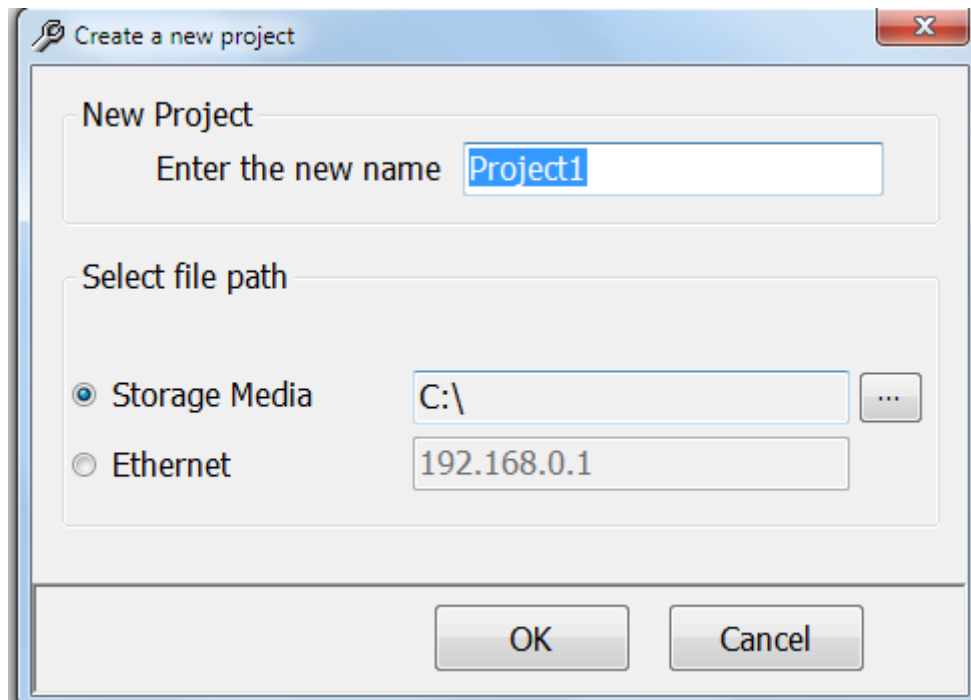


3. Remove Removable media from Recorder. Insert in PC
4. Double click at historical viewer icon  at desktop and follow on screen instructions to create a new project

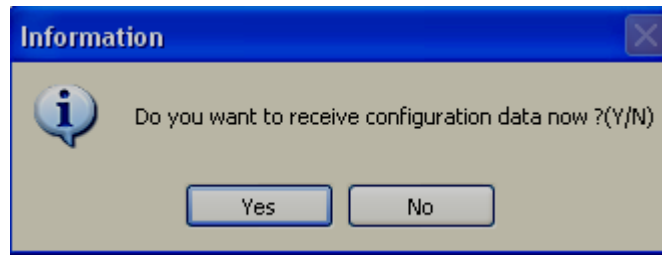


Select PR Recorder. Click “OK”

Note: Above screen appears first time if no project files available in Computer



Select Storage Media, path to the Recorder files in USB stick or SD card and click “OK”



Click “Yes”. It will open Recorder configuration screen

Display/Change configuration data from: C:\Program Files\Historical Viewer\Historical\Project1.daq

File(F) Edit(E) Language(L) Help(H)

Channel

- AI
- DI
- Math
- AO
- DO
- External
- Display
- Tools
- Timer
- Clock
- Communication
- Instrument
- Password
- Demo
- Auto-Output
- System Info

AI1

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

Name AI1 Desc Type Enable

Filter Disable

Log

Data Type 2 Byte Value Range: -3276.8 ~ 3276.7

Trigger Enable Method Instant

Speed 100 ms/Dot

Offset 0.0 Gain 1.0

Sensor


Type Thermocouple J Type Unit: °C

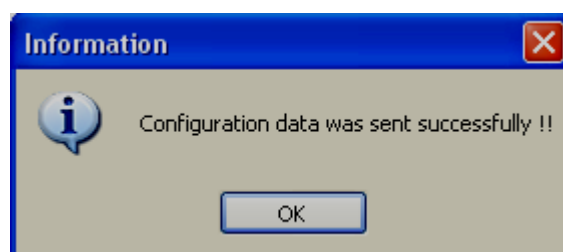
Range -200.0 ~ 1100.0

Events

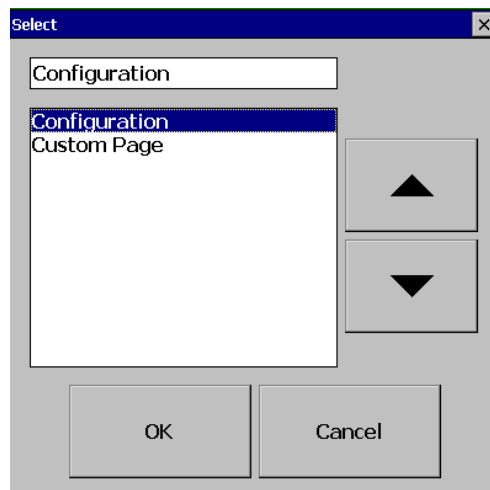
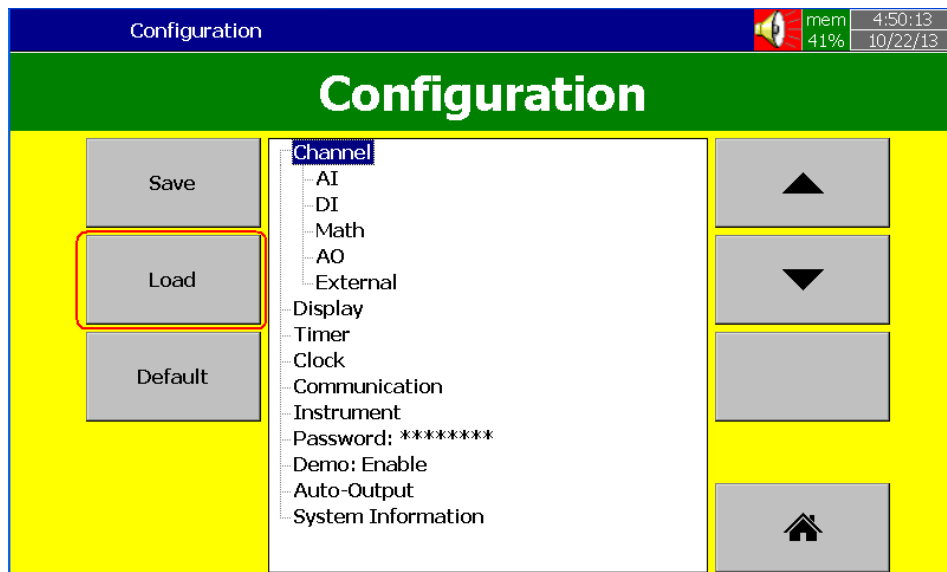
No.	Type	Setpoint	Log	Message	Job1	Job2	Hysteresis
1	H	840.0	Log Alarm		No Action	No Action	0.0
2	L	60.0	Log Alarm		No Action	No Action	0.0
3	HH	937.5	Log Alarm		No Action	No Action	0.0
4	LL	-37.5	Log Alarm		No Action	No Action	0.0
5	Error	0	Log Alarm		No Action	No Action	0.0

Note: The configuration screen is same as available directly in Recorder. Please refer Chapter 3 & 4 for more details about configuration

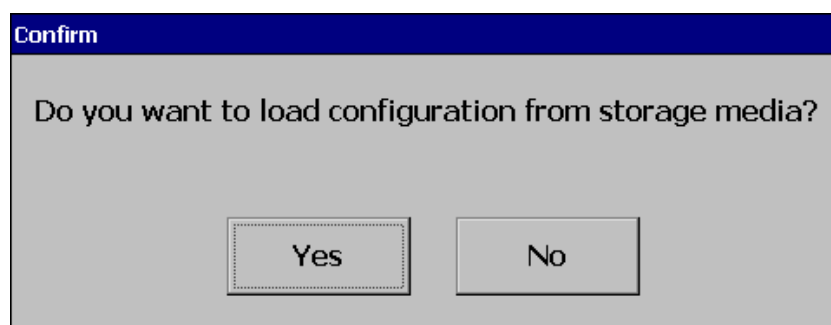
5. Do the required changes in the configuration. Click at Send configuration icon 



6. Now, remove Removable media from PC. Insert it into the Recorder.  
In Recorder, press "Menu-More-Config"  
Press "Load"



Press "OK"



Press "Yes"

## 8.2.9 Configuration

Please refer Chapter 4 for full details related to configuration

### ● Analog Input

**Channel**

- AI
- DI
- Math
- AO
- DO
- External
- Display
- Tools
- Timer
- Clock
- Communication
- Instrument
- Password
- Demo
- Auto-Output
- System Info

AI1

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

Name

AI1

Desc

Type

Enable

Filter Disable

Log

Data Type 2 Byte

Value Range: -3276.8 ~ 3276.7

Trigger Enable

Method Instant

Speed 100 ms/Dot

Offset 0.0

Gain 1.0

Sensor

Type Thermocouple J Type

Unit : °C

Range -200.0 ~ 1100.0

Events

No.	Type	Setpoint	Log	Message	Job1	Job2	Hysteresis
1	<span>H</span>	840.0	<span>Log Alarm</span>		No Action	No Action	0.0
2	<span>L</span>	60.0	<span>Log Alarm</span>		No Action	No Action	0.0
3	<span>HH</span>	937.5	<span>Log Alarm</span>		No Action	No Action	0.0
4	<span>LL</span>	-37.5	<span>Log Alarm</span>		No Action	No Action	0.0
5	<span>Error</span>	0.0	<span>Log Alarm</span>		No Action	No Action	0.0

### ● Digital Input

**Channel**

- AI
- DI
- Math
- AO
- External
- Display
- Tools
- Timer
- Clock
- Communication
- Instrument
- Password
- Demo
- Auto-Output
- System Info

DI1

1

2

3

4

Name

DI1

Desc Tank level high

Type Logic Level

Events

No.	Type	Log	Message	Job1	Job2
1	<span>Disab</span>	No Action		No Action	No Action
2	<span>Disab</span>	No Action		No Action	No Action

## ● Math channel

**Channel**

- AI
- DI
- Math**
- AO
- External
- Display
- Tools
- Timer
- Clock
- Communicati
- Instrument
- Password
- Demo
- Auto-Output
- System Info

**Math1**

1 2 3 4 5 6 7 8 9 10 11 12

Name: Math1 Desc: Totalizer 6

Type: Math

**Log**

Data Type: 4 Byte Value Range: -3.4E+38 ~ 3.4E+38

Trigger: Enable Method: Instant

Speed: 100 ms/Dot

Expression: (AI1+AI2)/2

**Scale**

Unit: Transformation: Value

Decimal: 0 Table: Point 1 to 2

Range: 0 ~ 10

**Events**

No.	Type	Setpoint	Log	Message	Job1	Job2	Hysteresis
1	H	0	No Action		No Action	No Action	0
2	Disab	0	No Action		No Action	No Action	0
3	Disab	0	No Action		No Action	No Action	0
4	Disab	0	No Action		No Action	No Action	0
5	Disab	0	No Action		No Action	No Action	0

## ● Analog Output

**Channel**

- AI
- DI
- Math
- AO**
- External
- Display
- Tools
- Timer
- Clock
- Communicati
- Instrument
- Password
- Demo
- Auto-Output
- System Info

**AO1**

1 2

Desc:

Type: Current

Output: 4-20mA

Expression:  $4 + (20 - 4) * (AI1 - (-120)) / (1000 - (-120))$

## ● External Channel

**Channel**

- AI
- DI
- Math
- AO
- External**

**Display**

- Tools
- Timer
- Clock
- Communicati
- Instrument
- Password
- Demo
- Auto-Output
- System Info

**External1**

1 2 3 4 5 6 7 8 9 10 11 12

Name: Ext1 Desc:

Type: Enable

**Log**

Data Type: 2 Byte Value Range: -32768 ~ 32767

Trigger: Enable Method: Instant

Speed: 100 ms/Dot

**Modbus Register Value(MV) Conversion**

Data Type: 2 Byte

Formula:  $((MV-RL)/(RH-RL))*(SH-SL)+SL$

**Range**

Low(RL): 0.0 High(RH): 65535.0

**Scale**

Unit:

Low(SL): 0.0 High(SH): 65535.0

**Events**

No.	Type	Setpoint	Log	Message	Job1	Job2	Hysteresis
1	Disab	0	No Action		No Action	No Action	0
2	Disab	0	No Action		No Action	No Action	0

## ● Display

**Channel**

- AI
- DI
- Math
- AO
- External
- Display**

**Tools**

- Timer
- Clock
- Communicati
- Instrument
- Password
- Demo
- Auto-Output
- System Info

**Display1**

1 2 3 4 5 6 7 8 9 10 11 12

Name: Page1 Mode: Trend Direction: Horizontal

Speed: 1 Sec/Dot Background: Black

**Pen**

No.	Channel	Color	Width	Display Low	Display High
1	AI1	Blue	1	-120.0	1000.0
2	AI2	Lime	1	-200.0	1370.0
3	AI3	Cyan	1	-250.0	400.0
4	AI4	Red	1	-100.0	900.0
5	AI5	Magenta	1	0.0	1820.0
6	AI6	Yellow	1	0.0	1767.8
7	AI7	Gray	1	0.0	1767.8
8	AI8	Dark Blue	1	-250.0	1300.0

**Status Bar**

Type: Disable

1. Disable	2. Disable	3. Disable	4. Disable
5. Disable	6. Disable	7. Disable	8. Disable

## ● Timer

Channel

- AI
- DI
- Math
- AO
- External
- Display
- Tools
  - Timer
  - Clock
- Communication
- Instrument
- Password
- Demo
- Auto-Output
- System Info

### Timer1

1 2 3 4 5 6 7 8 9 10 11 12

Type Daily Action Enable

#### Time

Day Hour Min Sec

1 8 0 1

#### Events

Job1 Print Report List

Job2 No Action

## ● Clock

Channel

- AI
- DI
- Math
- AO
- External
- Display
- Tools
  - Timer
  - Clock
- Communication
- Instrument
- Password
- Demo
- Auto-Output
- System Info

### Clock

Date Style MM/dd/yy

#### Date/Time Synchronization

Date : 10/18/13

Time : 22:48:06

Date/Time Synchronization is to adjust the clock of the recoder and then the system date/time of both PC and recoder will be the same. It only functions when you press 'Synchronize' button below.

Synchronize

#### Summer time

Type Enable

From 04 / 01 02 : 00

To 10 / 31 03 : 00



## ● Communication

File(F) Edit(E) Language(L) Help(H)

Channel

- AI
- DI
- Math
- AO
- DO
- External
- Display
- Tools
- Timer
- Clock
- Communication**
- Instrument
- Password
- Demo
- Auto-Output
- System Info

Ethernet

Serial Modbus Client/Master Email

Web Server

IP  Modbus TCP Port

DNS Server

Display/Change configuration data from: C:\Program Files\Historical Viewer\Historical\Project1.daq

File(F) Edit(E) Language(L) Help(H)

Channel

- AI
- DI
- Math
- AO
- DO
- External
- Display
- Tools
- Timer
- Clock
- Communication**
- Instrument
- Password
- Demo
- Auto-Output
- System Info

Ethernet Serial Modbus Client/Master Email

RS232/485

Protocol  Address

Baud Rate  Data Format

Channel

- AI
- DI
- Math
- AO
- External
- Display
- Tools
- Timer
- Clock
- Communication**
- Instrument
- Password
- Demo
- Auto-Output
- System Info

Modbus Client/Master

Ethernet Serial Modbus Client/Master Email

Connections

1 2 3 4 5 6 7 8 9 10 11

Name  Type  Slave ID

Commands

1 2 3 4 5 6 7 8 9 10 11

Action  Connection

To Channel

First  Last

From Device

Type  Start Address

Data Type

Sample Rate

Ethernet  Serial

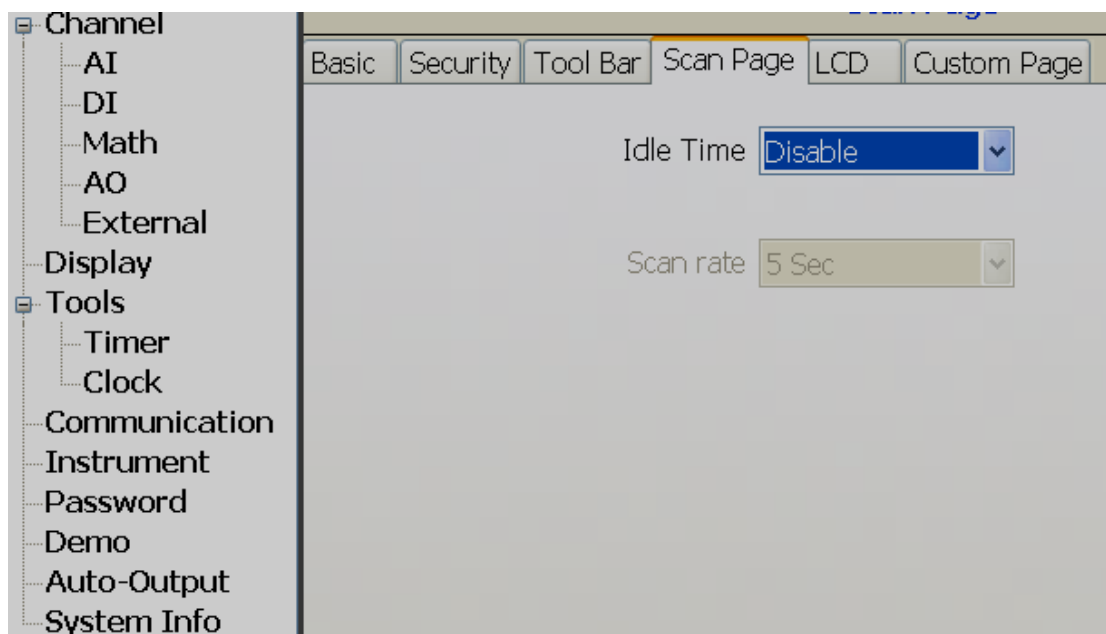
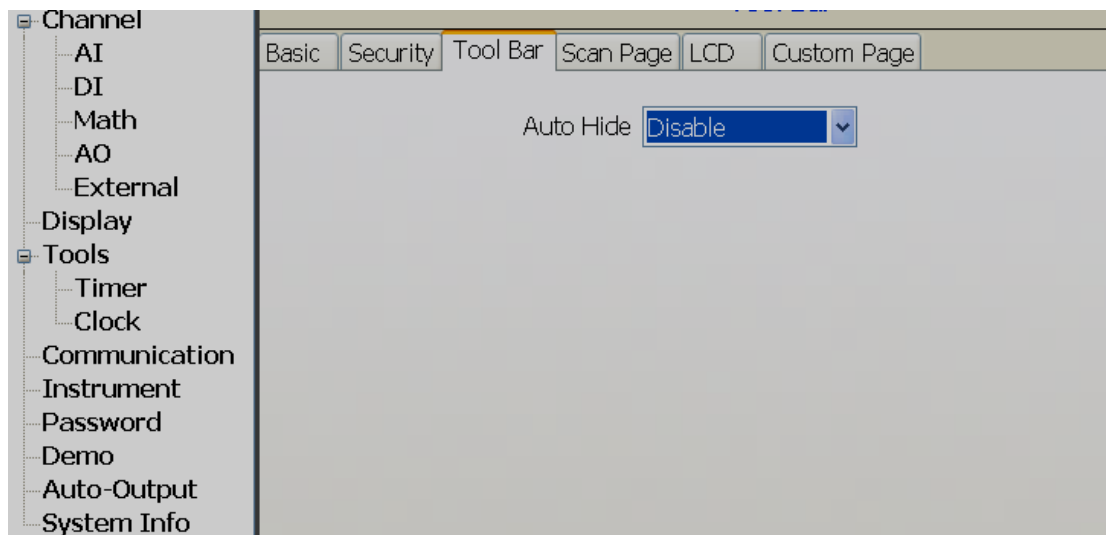
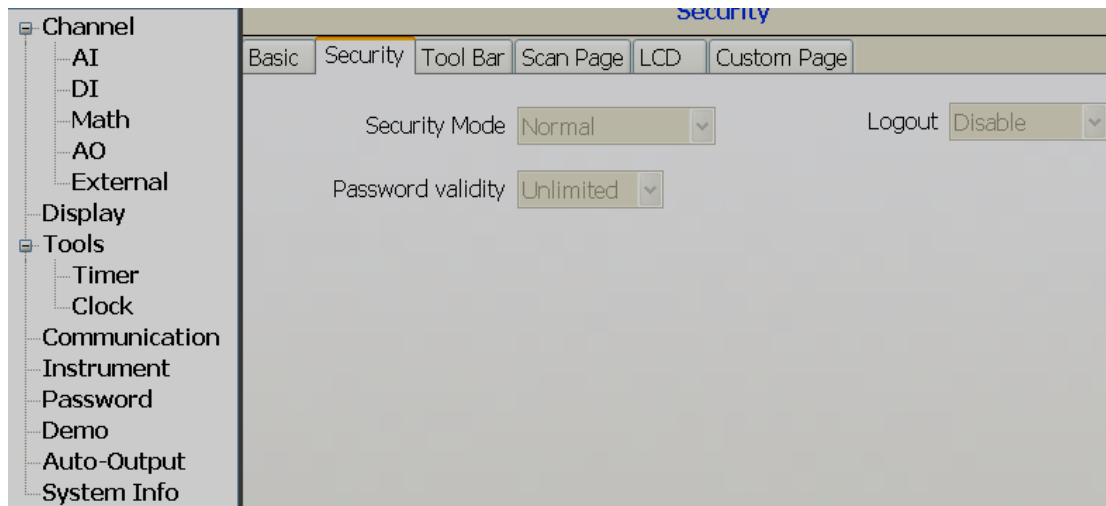
The screenshot shows the 'Email' configuration window. On the left is a tree view with categories: Channel, Display, Tools, Communication, Instrument, Password, Demo, Auto-Output, and System Info. The 'Email' tab is selected. The window contains the following fields:

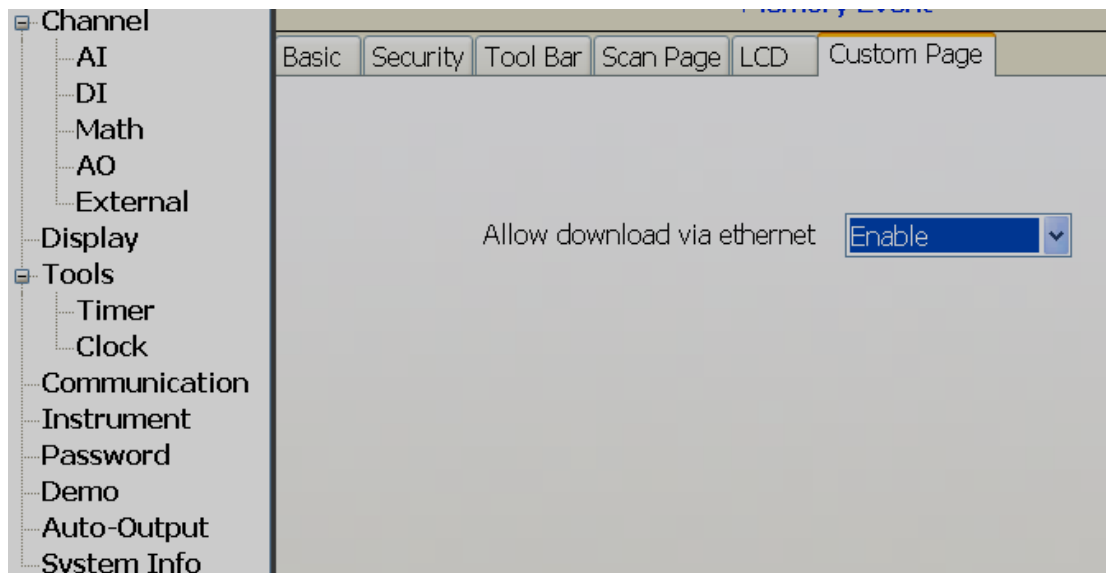
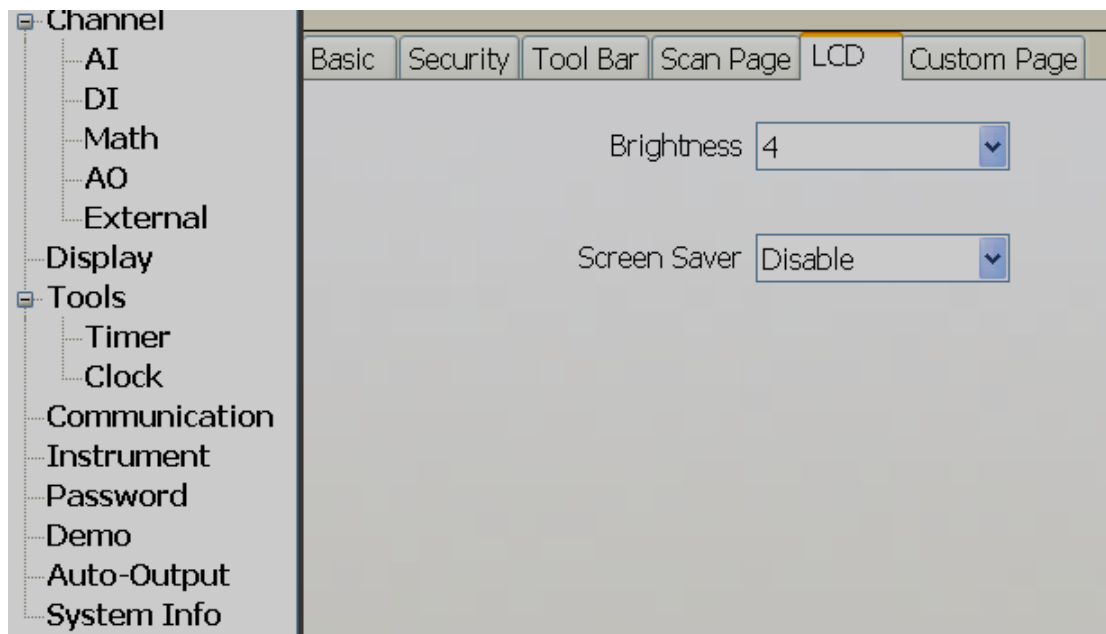
- Email:** Enable (dropdown)
- SMTP Server:**
  - Host: [text box]
  - Port: 25
  - User: vasu
  - Authentication: Enable (dropdown)
  - User Name: vasudev
  - Password: [masked with asterisks]
- Address:**
  - From: [text box]
  - To: 1 [text box], 2 [text box], 3 [text box], 4 [text box], 5 [text box], 6 [text box]

## ● Instrument

The screenshot shows the 'Instrument' configuration window. On the left is the same tree view as above, with 'Instrument' selected. The window contains the following fields:

- Basic:**
  - Language: English (dropdown)
  - Volume: Disable (dropdown)
  - External Storage: SD card (dropdown)
  - Data Transfer: Transfer and Remai (dropdown)
  - Batch Control: Disable (dropdown)





## ● Password

Channel	Security Password
AI	
DI	
Math	
AO	
External	
Display	
Tools	
Timer	
Clock	
Communication	
Instrument	
<b>Password</b>	<div> <div>Password</div> <input type="text"/> </div>
Demo	
Auto-Output	
System Info	

## ● Demo

Channel	Demo
AI	
DI	
Math	
AO	
External	
Display	
Tools	
Timer	
Clock	
Communication	
Instrument	
Password	
<b>Demo</b>	<div> <div>Demo</div> <div>Enable</div> <div>▼</div> </div>
Auto-Output	
System Info	

## ● Auto-Output

The screenshot shows the 'Auto-Output' configuration window. On the left is a tree view with the following items: Channel, AI, DI, Math, AO, DO, External, Display, Tools, Timer, Clock, Communication, Instrument, Password, Demo, Auto-Output (highlighted), and System Info. The main area is titled 'Auto-Output' and contains three sections:

- Historical Data:**
  - Print Period:** Mode is set to 'Last Minutes', the value is '1', and the unit is 'Minutes'.
  - Interval:** Set to '1 Sec/Dot'.
- Report:**
  - Mode:** Set to 'List'.
- Output Files:**
  - Compress:** Set to 'Disable'.
  - Password:** An empty text field.

## ● System Information

The screenshot shows the 'System Info' window. On the left is a tree view with the following items: Channel, AI, DI, Math, AO, External, Display, Tools, Timer, Clock, Communication, Instrument, Password, Demo, Auto-Output, and System Info (highlighted). The main area is titled 'System Info' and displays the following information:

- Version:** 0.80B9 Plus
- Slot1:** AI1,AI2,AI3,AI4,AI5,AI6,AI7,AI8,AI9,AI10,AI11,AI12
- Slot2:** AI13,AI14,AI15,AI16,AI17,AI18,AI19,AI20,DI1,DI2,DI3,DI4,AO1,AO2

## 8.2.10 How to view Historical data

Three ways

1. Touch screen
2. Ethernet
3. USB stick

### ● Touch Screen

Please refer Chapter 3 for details how to view historical data in Recorder directly using the Touch screen

### ● Ethernet

Note: Please read the following sections first

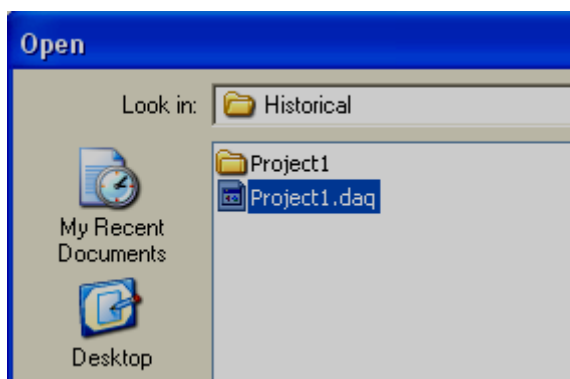
1. How to configure Communication bank
2. How to configure Recorder - Ethernet

Make sure, Project already created and it's saved in Computer, set bank properly to Ethernet before proceeding with the below steps

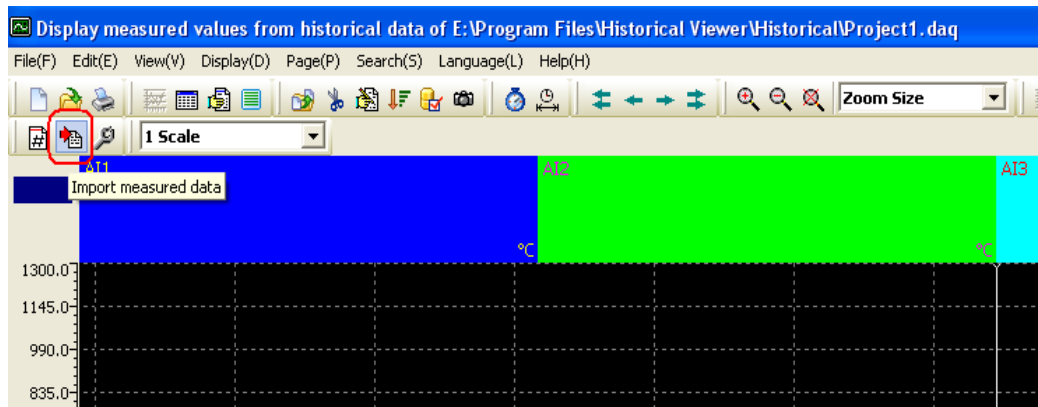
Open Project from Historical viewer using one of the following options


Desktop: Historical viewer icon 

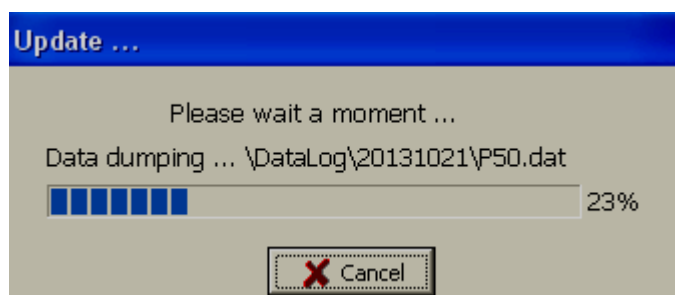
Start-Programs-Historical viewer-Historical viewer



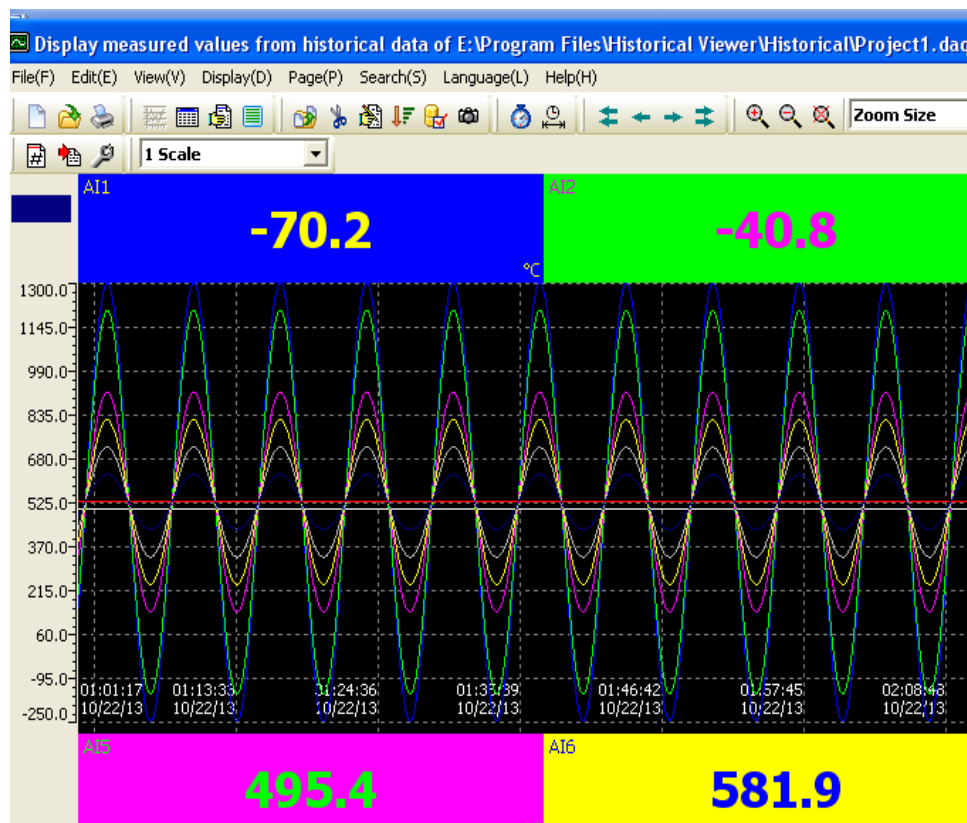
Select Project and click “Open”




Click Import measured data icon 



Note: Time taken based on amount of data available in internal memory





Select on any of the trend area, then click at Zoom icon  and then see the historical trend clearly

Note: Please read “Historical viewer” help file from software itself for all the features available in Historical viewer software.

- **Removable Media**

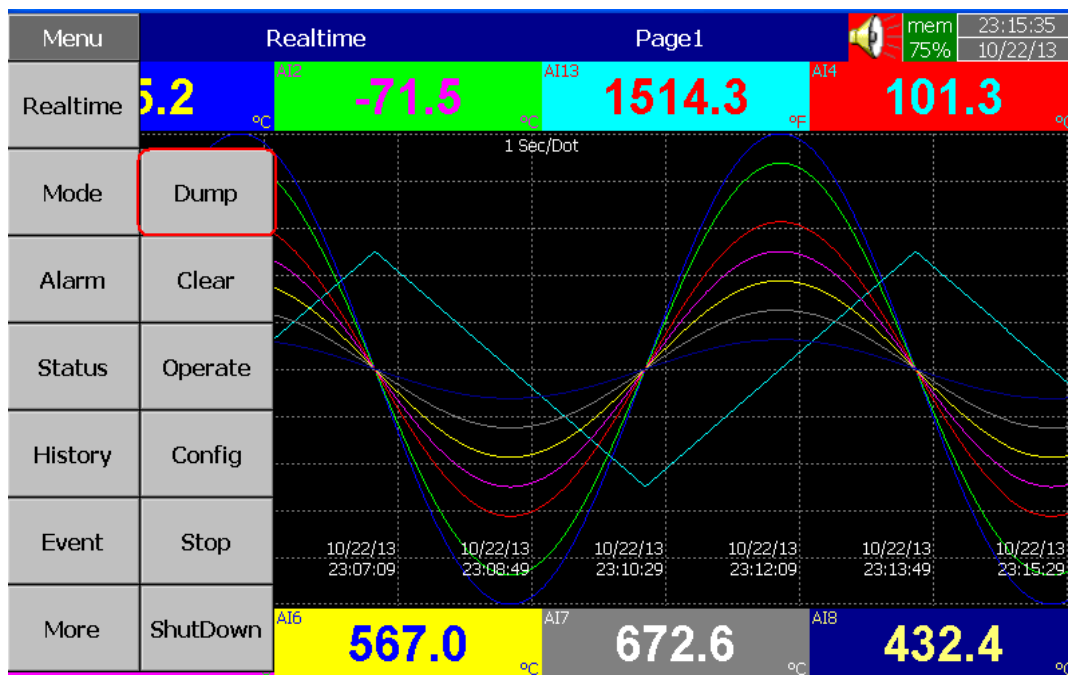
Note: Please read the following sections first

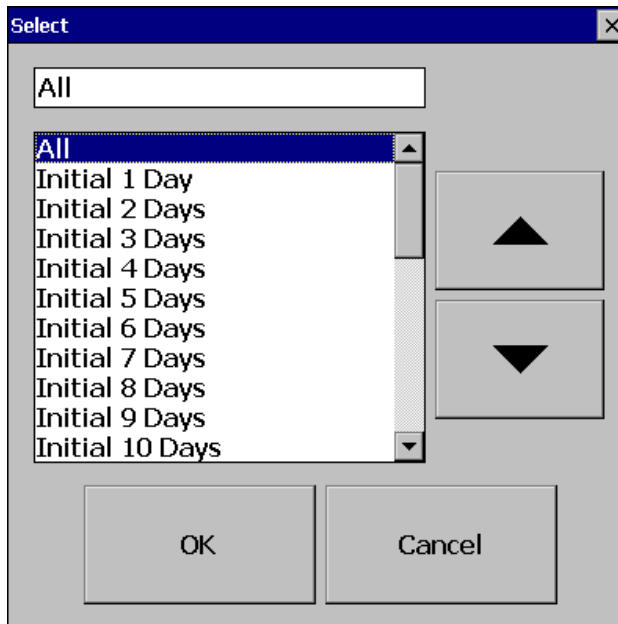
1. How to configure Communication bank
2. How to configure Recorder - SD card or USB

Make sure, Project already created via SD card or USB, it's saved in Computer, set bank properly to “Storage media” before proceeding with the below steps

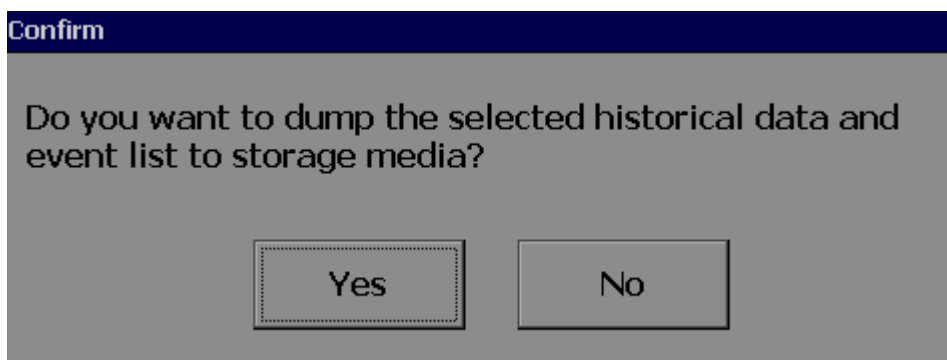
Insert Empty - SD card or USB in Recorder

Press “Menu-More-Dump”

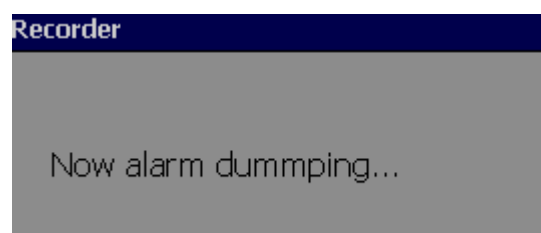




Select "All" or one of the other available options, then press "OK"

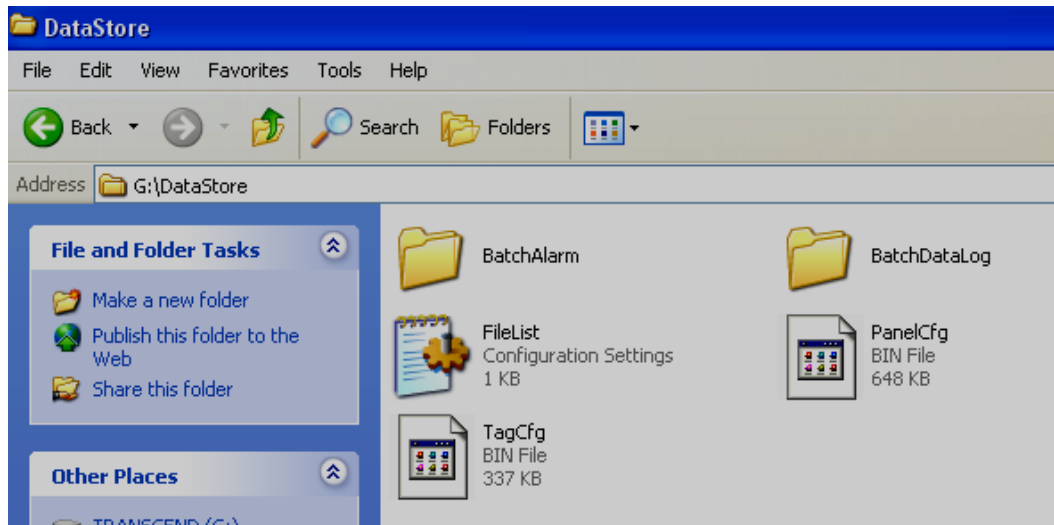


Press "Yes"




Now, remove USB stick from Recorder

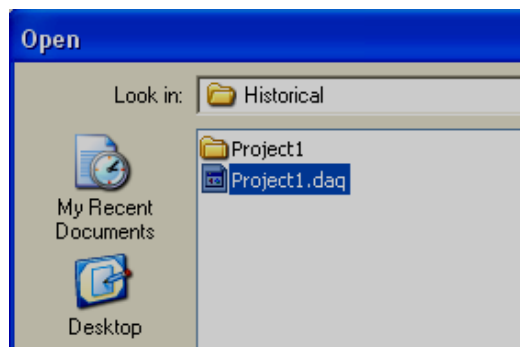
Check contents in the USB stick



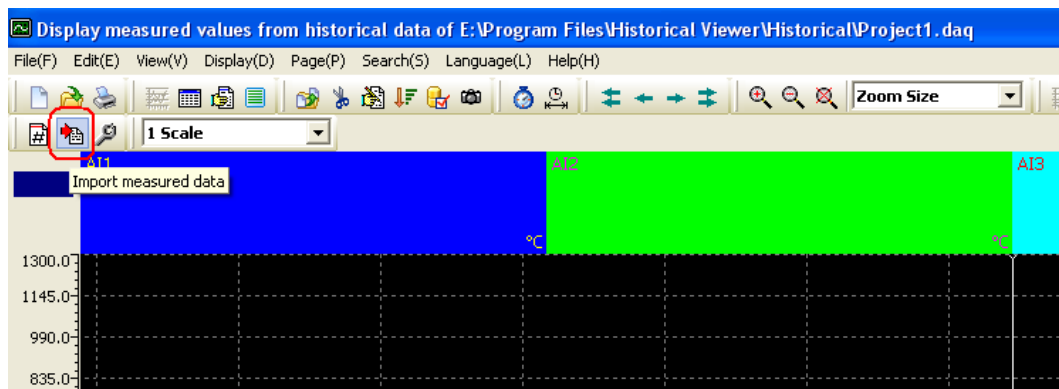
Open Project from Historical viewer using one of the following options


Desktop: Historical viewer icon 

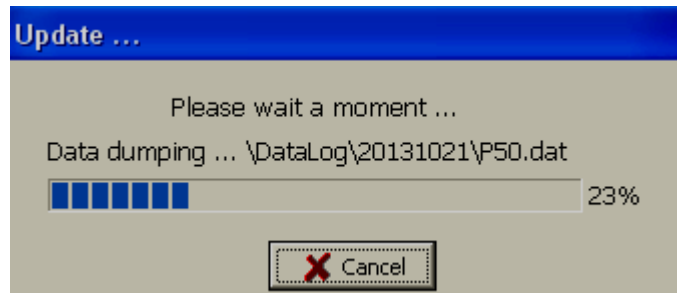
Start-Programs-Historical viewer-Historical viewer



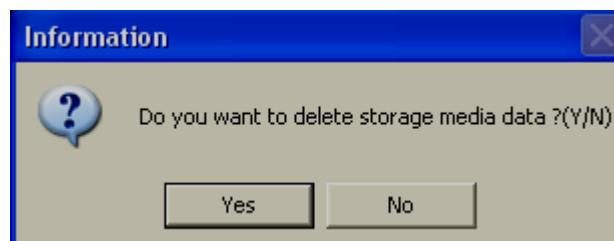
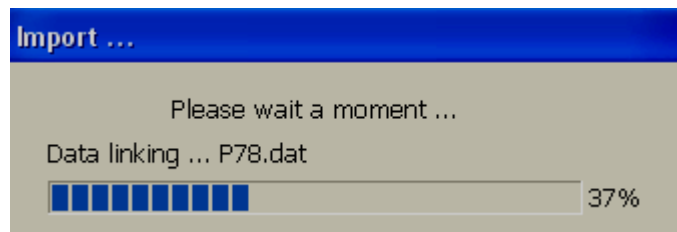
Select Project and click “Open”



Click Import measured data icon 

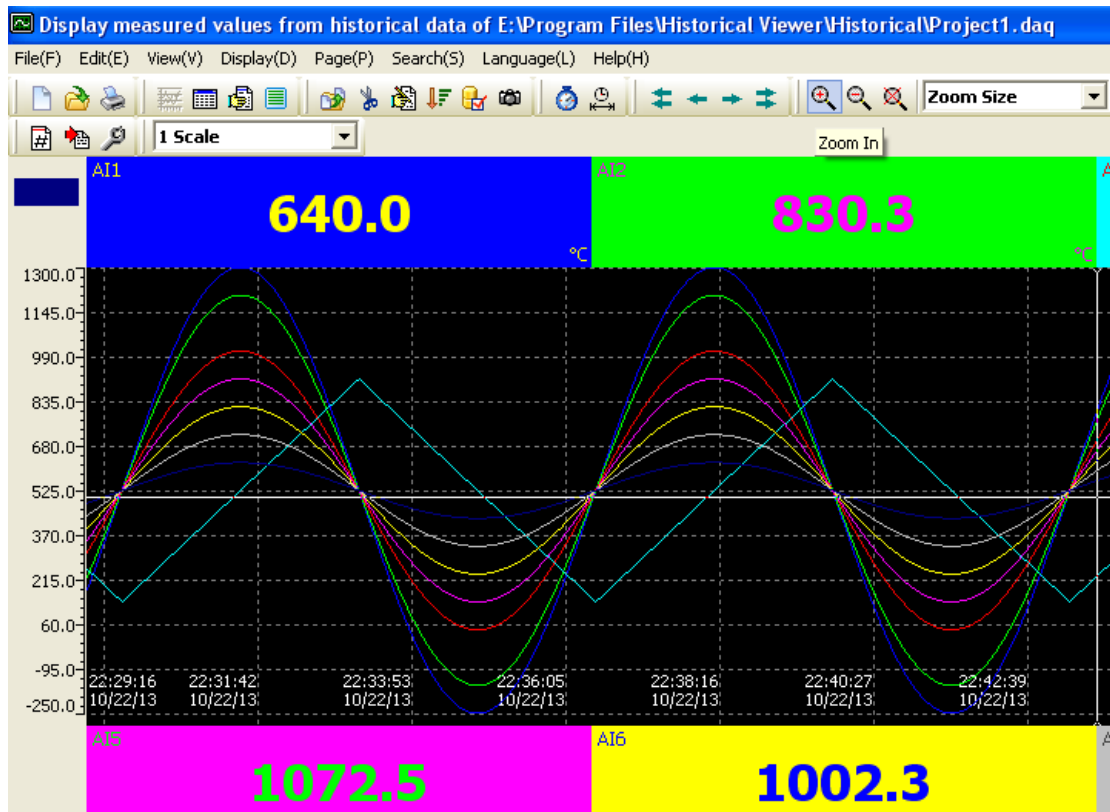



Note: Time taken based on amount of data available in internal memory



“Select” Yes if you wish to delete data from USB stick.

“Select” No only if any plans to transfer data say another Computer or if you have any plans to maintain data storage as back up in proprietary format in Computer hard disk



Select on any of the trend area, then click at Zoom icon  and then see the historical trend clearly

Note: Please read “Historical viewer” help file from software itself for all the features available in Historical viewer software

### 8.2.11 How to view Real time data in PC

It is possible to monitor Real time data from Paperless Recorder in PC

For this, Recorder should be connected to PC via Ethernet or Serial network (RS232/422/485). Set bank properly to proceed with required option

### 8.2.12 Bank configuration

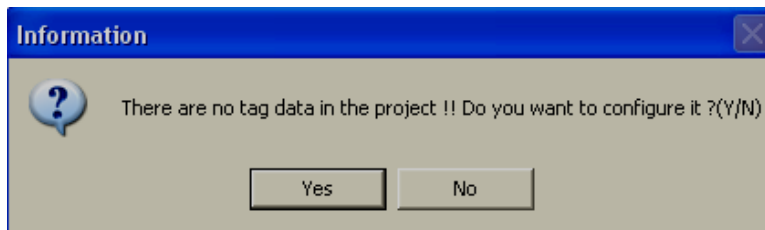
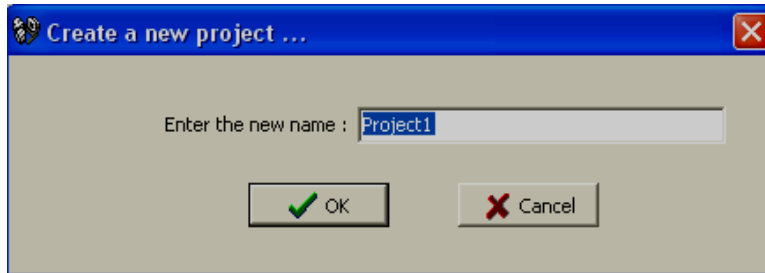
How to open Real time viewer

Two ways

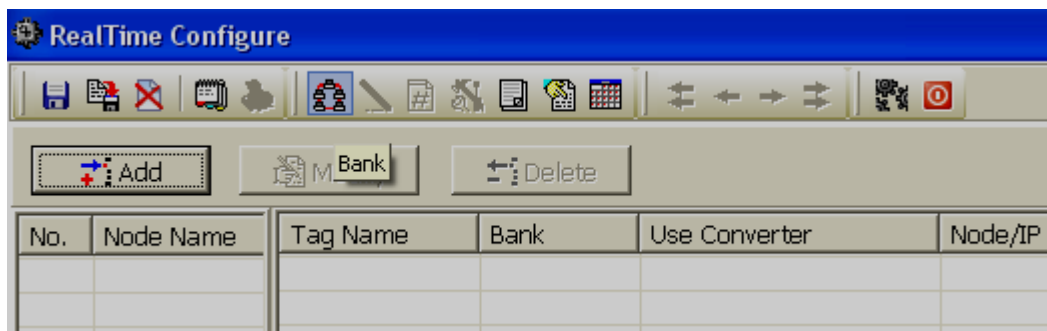
Click at desktop icon




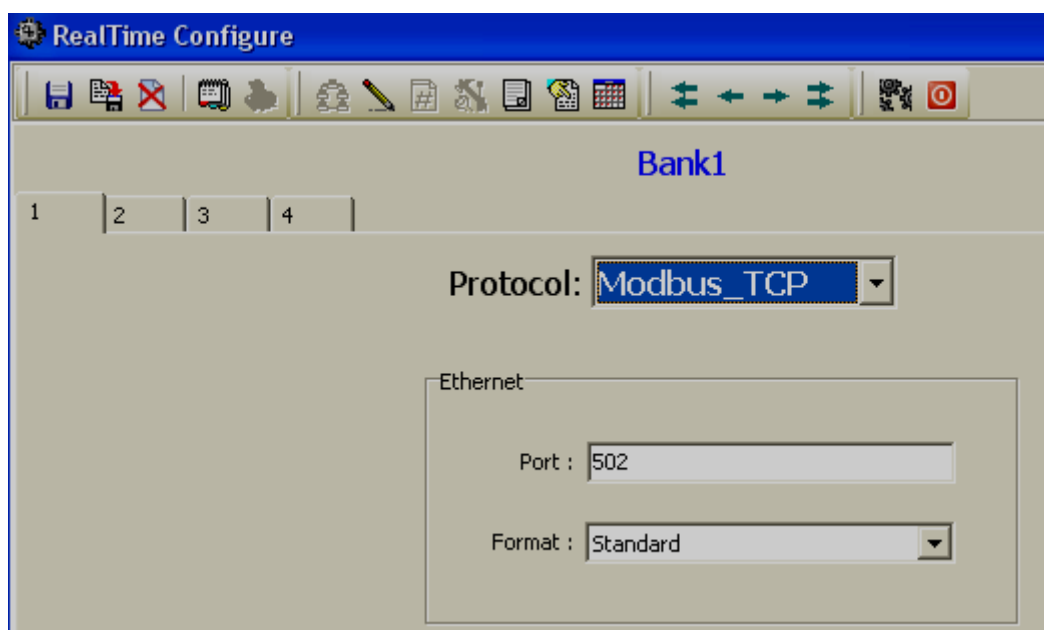
Start-Programs-Data Acquisition Studio Studio-Real time viewer



Click "No"





Click bank icon 

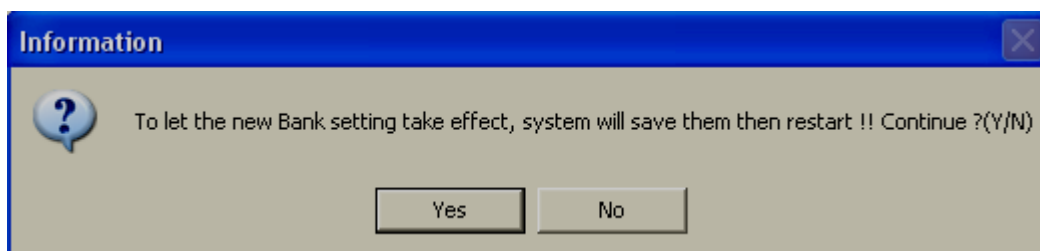


Total 4 communication banks are available

Each bank can be configured as Either Modbus Serial (232/422/485) or Modbus\_TCP (Ethernet)

For ex: If two Paperless Recorders are coming on two different RS485 networks, then, each bank can be configured for each Recorder, provided two COM ports are configured in PC to receive data from two different serial networks. You may use two USB to Serial converters for this application

After completing the bank setup, click "Save" icon  and close return to main program icon 



### 8.2.13 Ethernet

1. Install Data Acquisition Studio software
2. Set bank properly to Ethernet
3. If Recorder connected to PC via Ethernet, make sure Recorder is set with User define IP address and domain same as PC  
Use Ping instruction from the Dos prompt, make sure Recorder communicating with PC via Ethernet

```

C:\> Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

E:\Documents and Settings\Mahi>ping 192.168.0.11

Pinging 192.168.0.11 with 32 bytes of data:

Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
  
```

4. Create a new project in Data Acquisition Studio software and monitor real time data from Recorder directly from PC

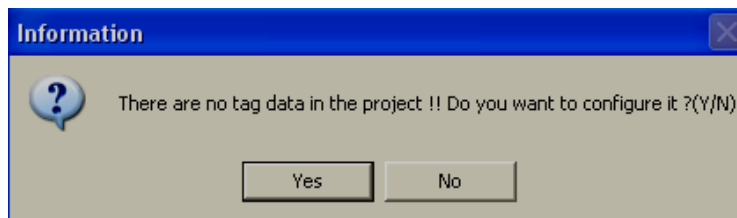
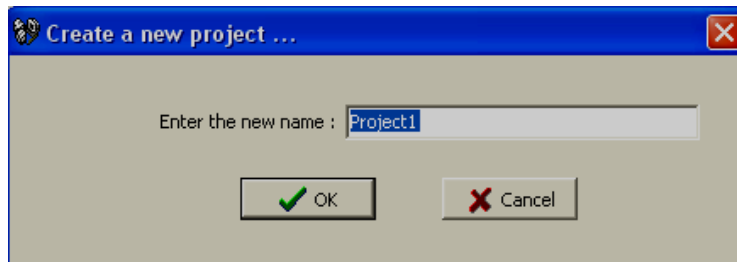
## How to open Real time viewer

Two ways

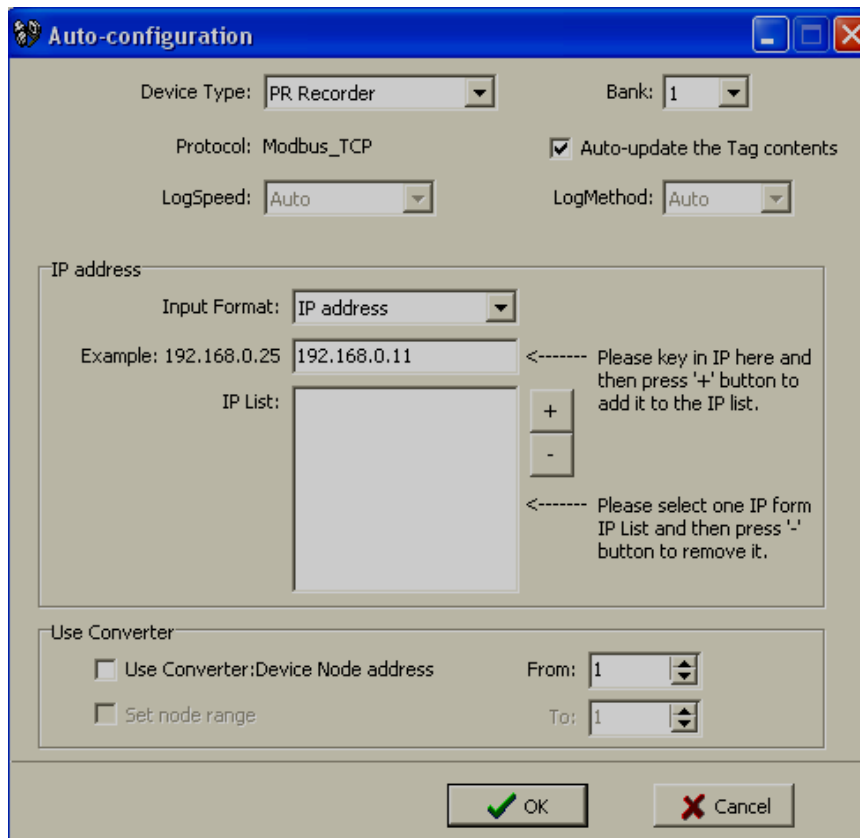
Click at desktop icon



Start-Programs-Data Acquisition Studio Studio-Real time viewer



Click "Yes"





IP address

Input Format: IP address

Example: 192.168.0.25

IP List: 192.168.0.11

+  
-

Please key in IP here and then press '+' button to add it to the IP list.

Please select one IP form IP List and then press '-' button to remove it.

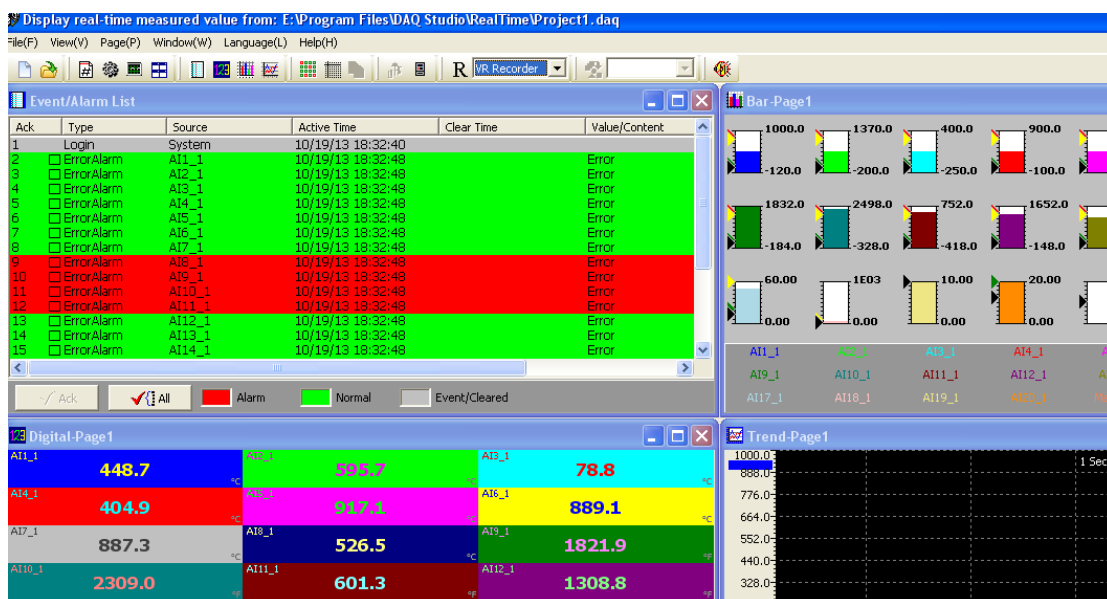
Click "OK"

RealTime Configure

Add Modify Delete

No.	Node Name	Tag Name	Bank	Use Converter	Node/IP	Device Type	Tag Type
	All List	AI1_1	1	No	192.168.0.11	PR Recorder	Channel_1
1	PR Recorder_1	AI2_1	1	No	192.168.0.11	PR Recorder	Channel_2
		AI3_1	1	No	192.168.0.11	PR Recorder	Channel_3
		AI4_1	1	No	192.168.0.11	PR Recorder	Channel_4
		AI5_1	1	No	192.168.0.11	PR Recorder	Channel_5
		AI6_1	1	No	192.168.0.11	PR Recorder	Channel_6

Click "Save" icon and close return to main program icon



Note: When real time viewer is running in PC, then, data will be stored in computer hard disk. This data can be archived later from Real time viewer itself from “Measured data” icon. This data is same as Paperless Recorder internal memory (Historical data)

In case if PC running round the clock like a server, then, there may be no need to manually transfer historical data from Recorder to PC via Memory stick.

Note: Please read “Real time viewer” help file from software itself for all the features available in Real time viewer software

#### **8.2.14 Serial (RS232/422/485)**

The procedure is similar to Ethernet. But need to set bank properly for Modbus Serial

#### **8.2.15 View Real time data from Multiple Recorders**

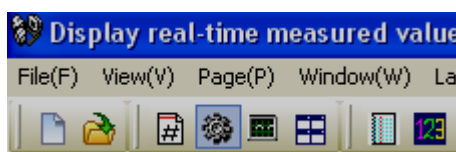
Assume, one Recorder database already added in Ethernet, IP address 192.168.0.11

Target: Connect second Recorder, IP address 192.168.0.12 to the Real time viewer

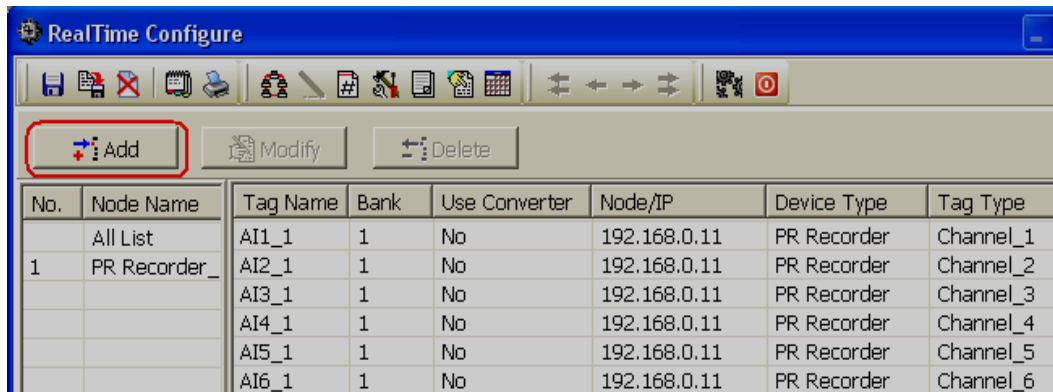
Connect both the Recorders and PC to Ethernet switch

Use “Ping” instruction at DOS prompt and check communication between PC and two Recorders. If no response, then check IP address at all the devices and also Ethernet cables

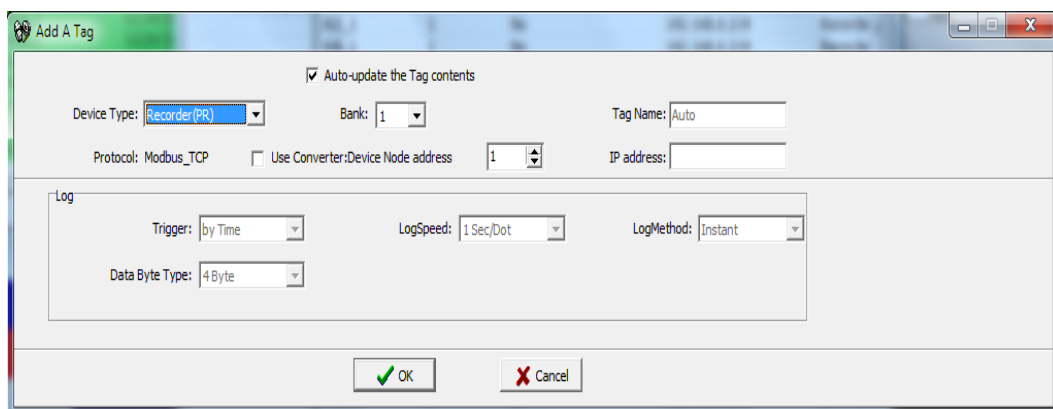
If there is good response from Recorders from “Ping” instruction, then, open Real time viewer



Click “Configuration data” icon 



Click “Add”



Select Device Type = PR Recorder

Deselect checkbox at Auto-updae the Tag contents

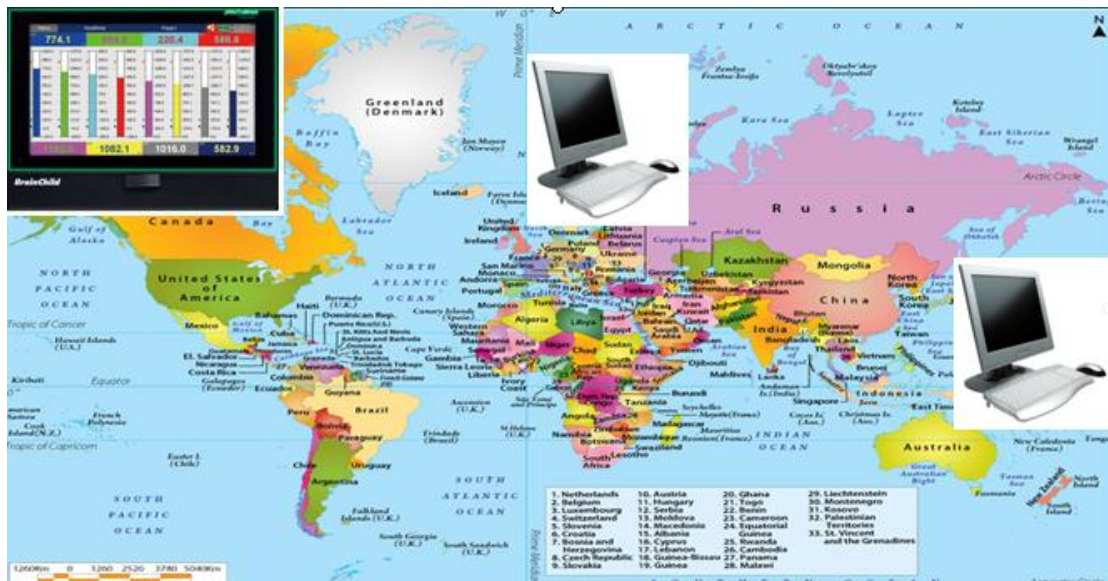
Enter “IP address of second Recorder”. (Make sure to select user define IP address in Recorder-do not select automation)

Click “OK”

Now, second Recorder database will add to Real time viewer.

## 9. Web server

It is to view Paperless Recorder from Remote location via Internet.



### 9.1 Requirements

#### 9.1.1 Hardware

Recommended hardware:  
PC with 3G GHZ processor, 512 MB RAM.  
5.0GB free space in the hard disk.  
Ethernet port, RJ 45 female.

#### 9.1.2 Operating system

Windows based Operating systems, Windows XP, Windows 7, Windows 8 etc..  
32 bit and 64 bit operating systems are supported.

#### 9.1.3 Browser Requirements

Internet Explorer 10 or higher.  
Google Chrome.

#### 9.1.4 IP Address Requirements

Static IP address Required for the Recorder.  
Obtain Static IP address from your Internet solution Provider (ISP). This IP address should be unique at Internet.

Once IP address configured in the Recorder, use Ping Instruction from the dos prompt first to verify if there is successful communication between Recorder and PC via Internet.

```

C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

E:\Documents and Settings\Mahi>ping 192.168.0.11

Pinging 192.168.0.11 with 32 bytes of data:

Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128
Reply from 192.168.0.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

E:\Documents and Settings\Mahi>_

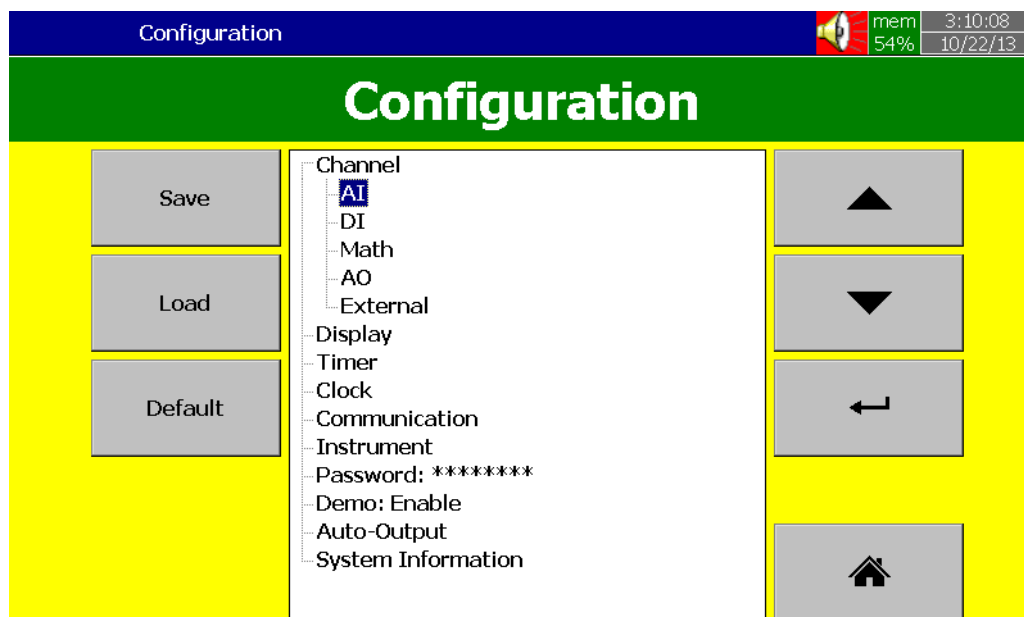
```

Fig: Response from the Recorder for the Ping instruction from PC

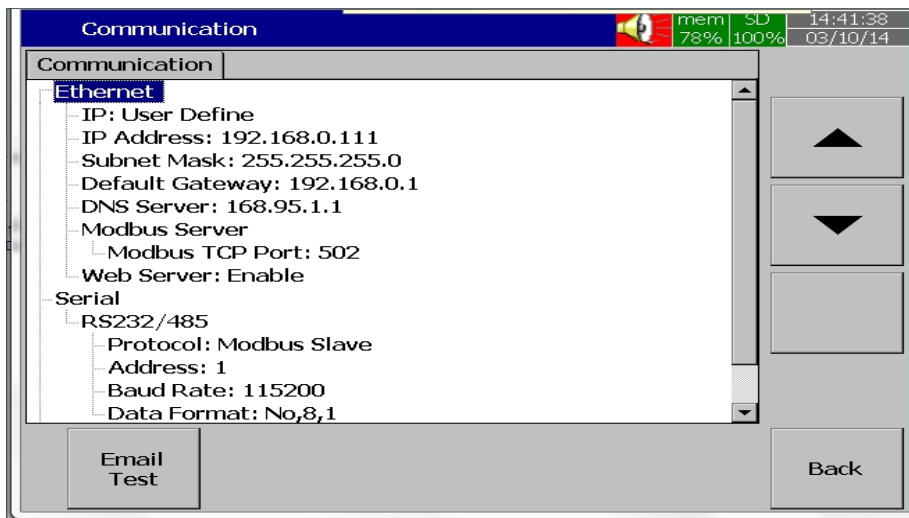
## 9.2 How to configure Web server Settings

For using Web server application in the PR series Recorder, Configure the Recorder for static IP address and Enable Web server.

### 9.2.1 How to Configure Static IP Address



In Configuration, select “Communication” and then press “Enter” soft key

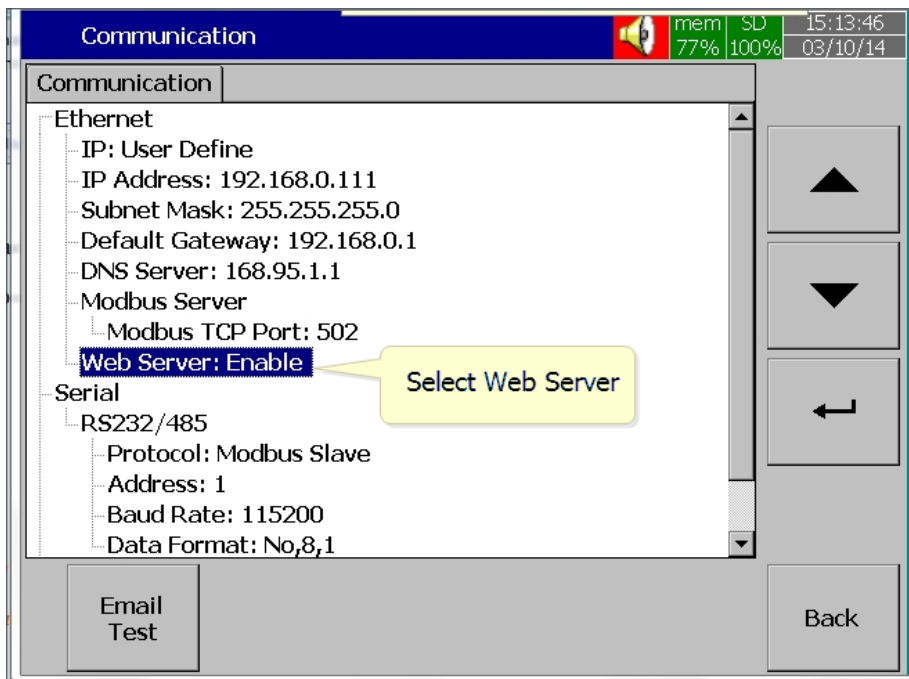


Select IP type = User Define.

Enter the IP Address, Subnet Mask, Default Gateway, DNS Server Settings in the Ethernet Settings.

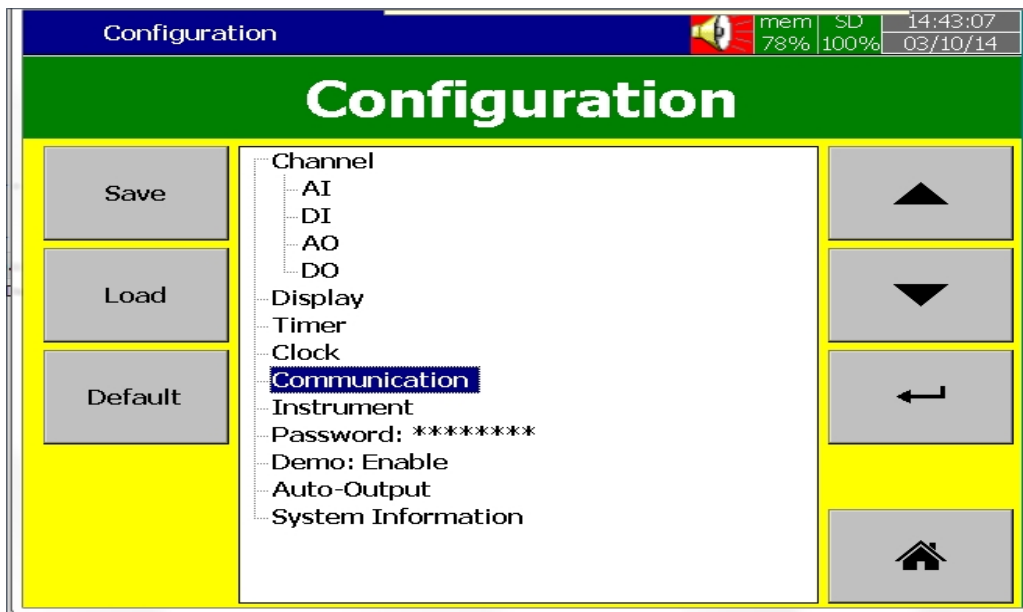
Note: Make sure to enter Global, Unique, static fix IP address received from Internet solution provider.

## 9.2.2 How to Enable Web Server



Select Web Server Menu in the Communication Menu.

Enable the Web Server for using Web Server application in the Recorder.



After completing the above steps, press “BACK” key first then “Home” key to return to main menu. It will save the configuration settings in the Recorder.

Now the Recorder is ready for the Web Server Applications.

### 9.3 How to View Recorder Data in PC Via Webserver:

Connect Paperless Recorder to the Internet

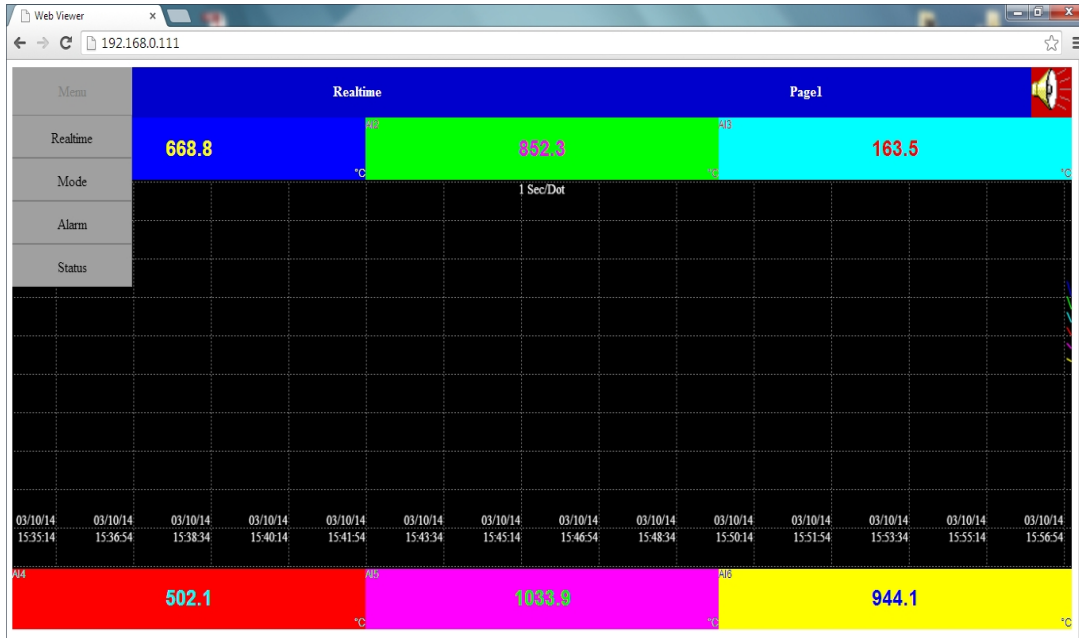
Open the browser (IE 10 or Google chrome) in the PC



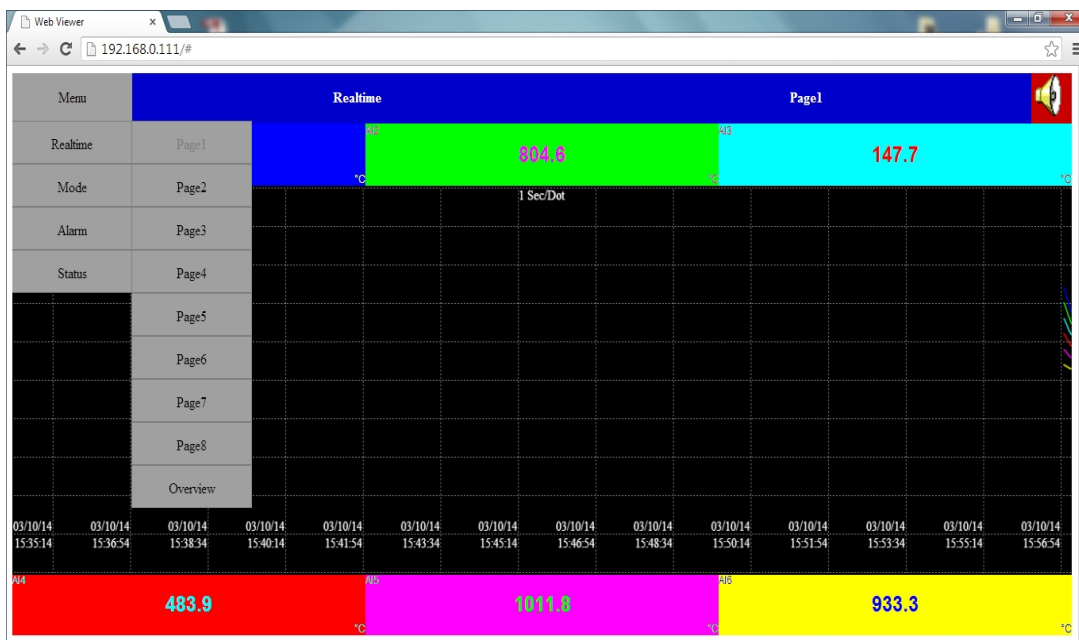
Enter the IP address of the Recorder in the address bar of the browser.

Format: <http://192.168.1.111>

Now you can see Paperless Recorder screens in browser as shown below



The display includes Real time values of all channels like AI, Math, Counters, Totalizers, Real time alarms, historical alarms, status of Digital Inputs, Digital Outputs, Analog Outputs, Counters, Totalizers etc..



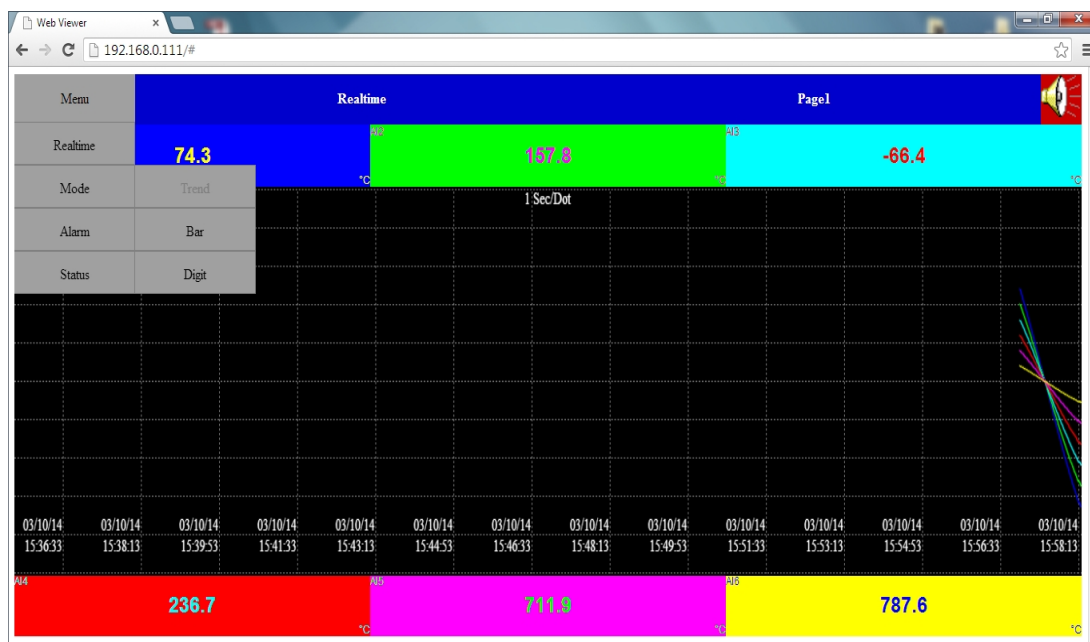
Press Overview to view the summary of all datas in single screen



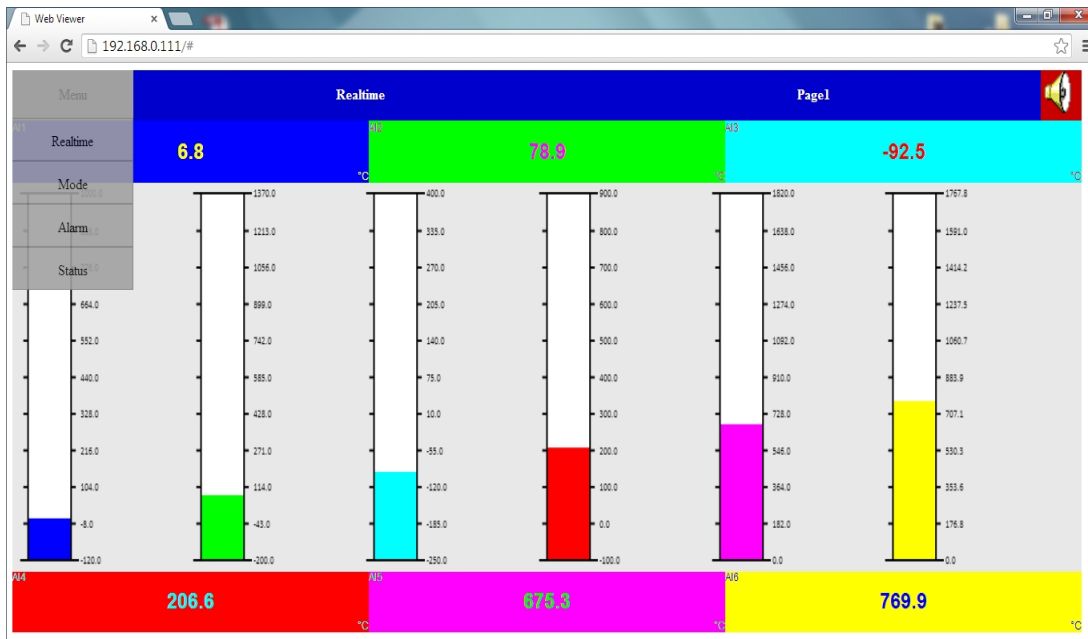
Memu	Realtime			Overview		
	AI1	AI2	AI3	AI4	AI5	
	159.4	257.3	-33.5	274.7	758.0	
	°C	°C	°C	°C	°C	
↑	AI6	AI7	AI8	AI9	AI10	
	810.1	1495.3	1869.2	426.7	1051.7	
	°C	°F	°F	°F	°F	
	AI11	AI12	AI13	AI14	AI15	
	2033.6	1799.6	16.60	27.70	38.86	
	°F	°F	%	%	%	
↑	AI16	AI17	AI18	AI19	AI20	
	83.40	72.26	61.13	-48.4	65.8	
	%	%	%	°F	°F	
	AI21	AI22	AI23	AI24	Counter9	
	-170.5	362.5	1197.4	1393.4	0	
	°F	°F	°F	°F		
↓	Math2	Math3	Math4	Math5	Math6	
	1611.9	460.2	777.0	1275.6	989.5	
	°F	°F	°F	°F	°F	
	Math7	Math8	Math9	Math10	Math11	
	61.1	72.3	83.4	83.4	72.3	
	°F	°F	°F	°F	°F	
↓	Math12	Math13	Math14	Math15	Math16	
	61.1	207.8	191.5	137.0	-87.8	
	°F	°F	°F	°F	°F	

Pressing Mode You can view the datas in Bar Graph, Trend and Digital Values.

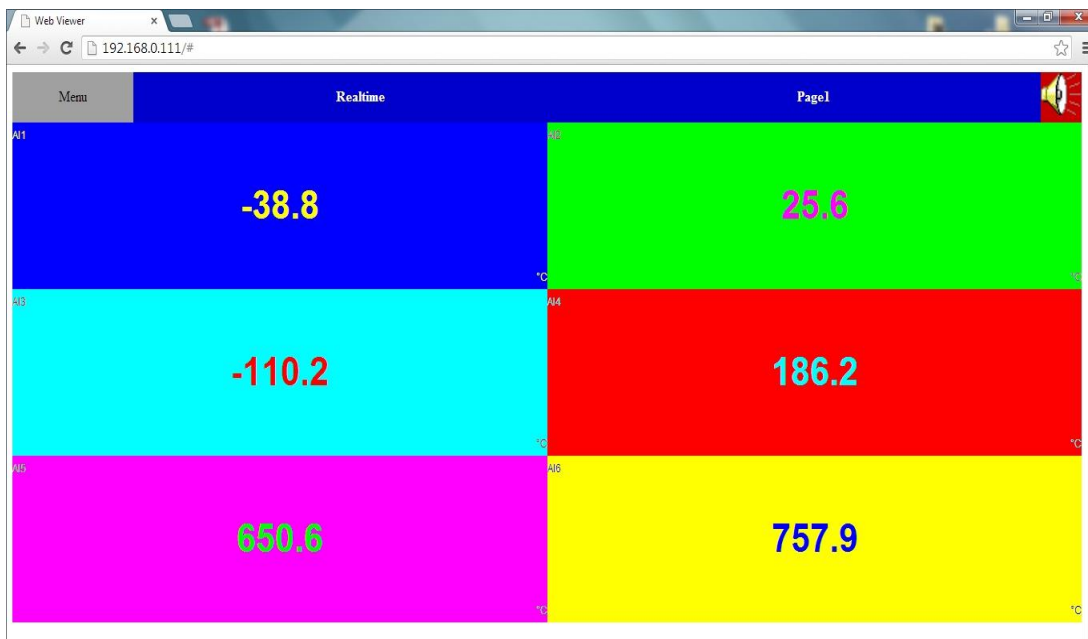
By Pressing Trend you can view the datas in trends.



By Pressing Bar You can view the datas in Bar Graph



By pressing the Digit You can view the Datas in the digital format



## Pressing Alarm You can view the List of Alarms with the details

No.	Active Time	Acked	Type	Name	Value
01	03/10/14 16:11:11		HiAlarm	AI7	-76.10
02	03/10/14 16:11:11		LoAlarm	AI7	-76.10
03	03/10/14 16:11:11		LoAlarm	AI8	33.40
04	03/10/14 16:11:11		HiAlarm	AI19	1817.70
05	03/10/14 16:11:11		HiHiAlarm	AI19	1817.70
06	03/10/14 16:11:11		HiAlarm	AI20	2246.90
07	03/10/14 16:11:11		HiHiAlarm	AI20	2246.90
08	03/10/14 16:11:11		HiAlarm	AI21	531.65
09	03/10/14 16:11:11		HiAlarm	AI13	39.40
10	03/10/14 16:11:11		LoAlarm	AI16	19.99
11	03/10/14 16:11:11		HiHiAlarm	AI13	39.30
12	03/10/14 16:11:11		LoAlarm	AI16	11.70
13	03/10/14 16:11:11		HiAlarm	AI1	779.30
14	03/10/14 16:11:11		HiAlarm	AI14	60.10
15	03/10/14 16:11:11		LoAlarm	AI17	19.86
16	03/10/14 16:11:11		HiAlarm	AI2	1056.20
17	03/10/14 16:11:11		HiHiAlarm	AI1	861.20
18	03/10/14 16:11:11		HiHiAlarm	AI2	1176.10
19	03/10/14 16:11:11		HiAlarm	AI8	270.90
20	03/10/14 16:11:11		LoAlarm	AI19	270.95
21	03/10/14 16:11:11		LoAlarm	AI20	226.60
22	03/10/14 16:11:11		LoAlarm	AI19	67.85
23	03/10/14 16:11:11		HiAlarm	AI7	1437.30
24	03/10/14 16:11:11		LoAlarm	AI20	21.10
25	03/10/14 16:11:11		LoAlarm	AI21	-185.30
26	03/10/14 16:11:11		HiAlarm	AI8	1942.20
27	03/10/14 16:11:11		HiHiAlarm	AI7	1588.00
28	03/10/14 16:11:11		HiHiAlarm	AI8	2151.00
29	03/10/14 16:11:11		HiAlarm	AI9	570.70
30	03/10/14 16:11:11		LoAlarm	AI13	19.10
31	03/10/14 16:11:11		HiAlarm	AI14	60.10
32	03/10/14 16:11:11		LoAlarm	AI16	11.70

Pressing Status you can view the status of the Analog outputs, Digital Inputs, Digital Outputs, Counters and Totalizers.

By Pressing DI you can view the status of the Digital Inputs

No.	Name	Value	Description
1	DI1	Hi	
2	DI2	3	
3	DI3	Hi	
4	DI4	3	
5	DI5	Hi	
6	DI6	3	

By Pressing DO you can view the status of the Digital outputs


Web Viewer

192.168.0.111/#

Menu

Status

DO



DI	DO	AO	Counter	Totalizer
No.	Name	Value	Description	
1	DO1	Off		
2	DO2	Off		
3	DO3	Off		
4	DO4	Off		
5	DO5	Off		
6	DO6	Off		

By Pressing AO you can view the status of the Analog Outputs


Web Viewer

192.168.0.111/#

Menu

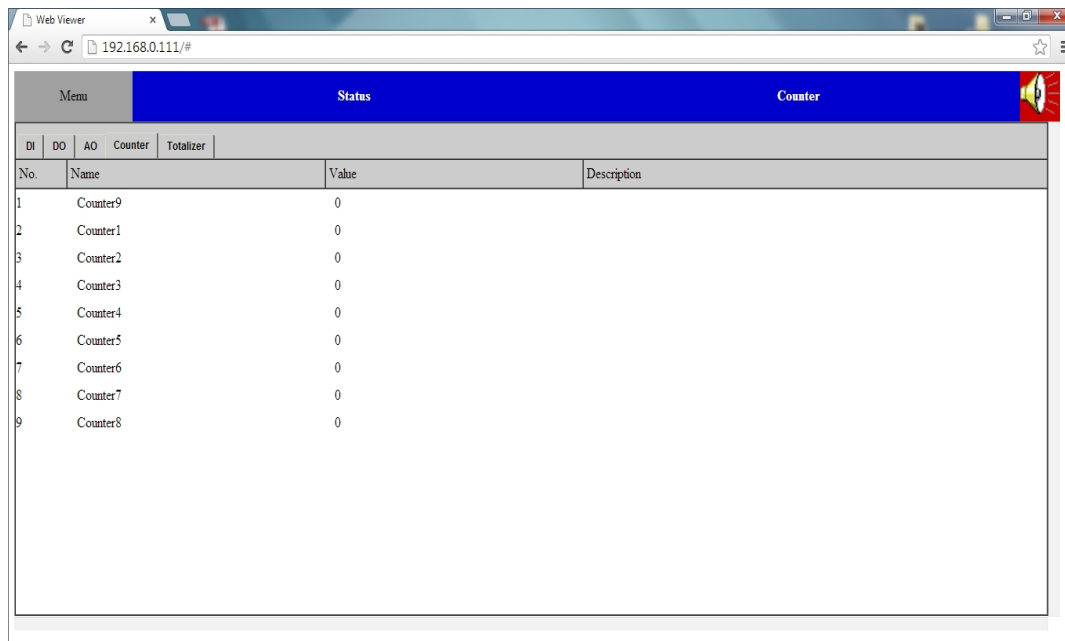
Status

AO



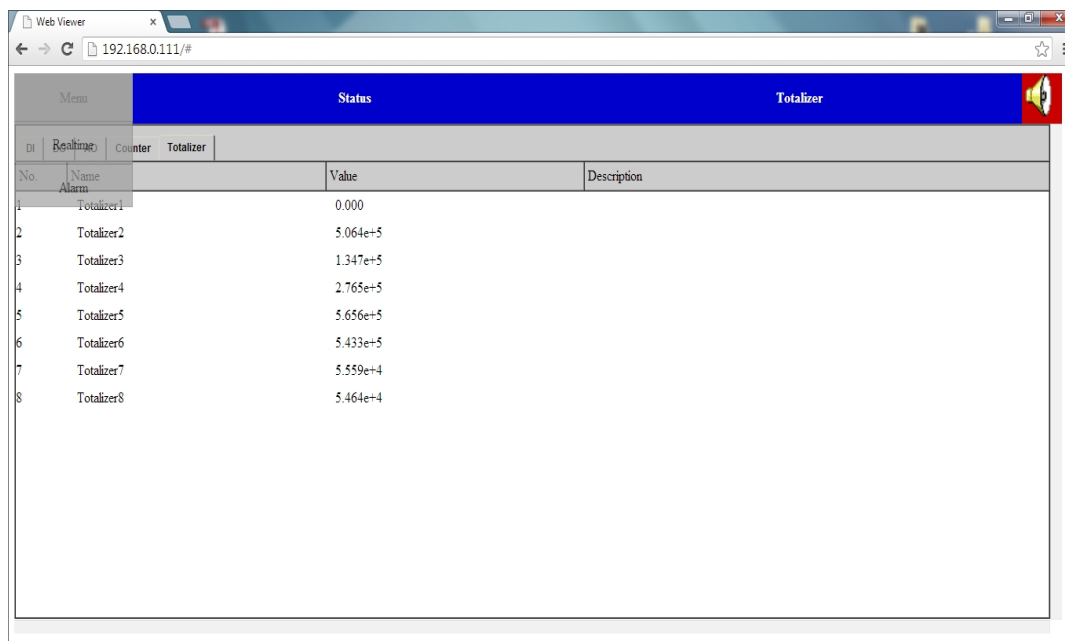
DI	DO	AO	Counter	Totalizer
No.	Name	Value	Description	
1	AO1	4.106		
2	AO2	5.421		
3	AO3	6.737		
4	AO4	8.051		
5	AO5	9.368		
6	AO6	10.684		

By pressing Counters you can view the status of the counters



Menu		Status	Counter
DI	DO	AO	Counter
No.	Name	Value	Description
1	Counter9	0	
2	Counter1	0	
3	Counter2	0	
4	Counter3	0	
5	Counter4	0	
6	Counter5	0	
7	Counter6	0	
8	Counter7	0	
9	Counter8	0	

By Pressing Totalizers you can view the status of the totalizers.



Menu		Status	Totalizer
DI	DO	AO	Totalizer
No.	Name	Value	Description
1	Totalizer1	0.000	
2	Totalizer2	5.064e+5	
3	Totalizer3	1.347e+5	
4	Totalizer4	2.765e+5	
5	Totalizer5	5.656e+5	
6	Totalizer6	5.433e+5	
7	Totalizer7	5.559e+4	
8	Totalizer8	5.464e+4	