Chromalox®

PRECISION HEAT AND CONTROL

User Manual

ECR1 Paperless Recorder
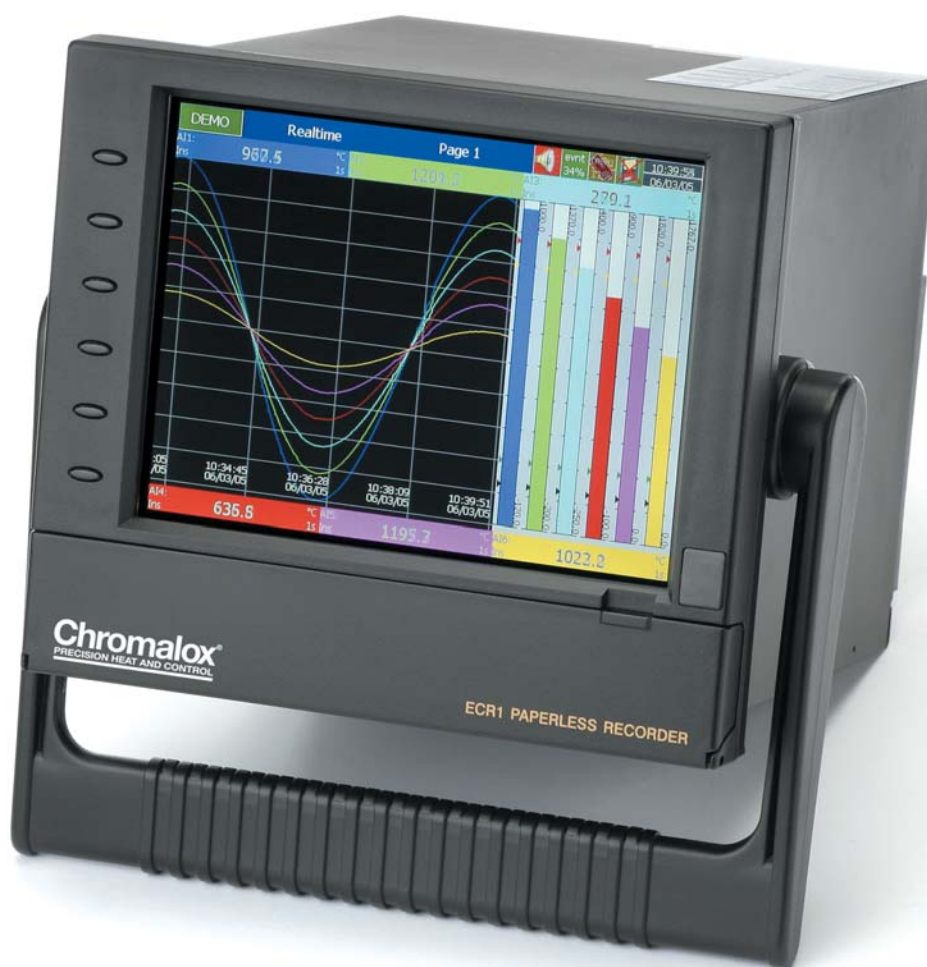
Table of Contents

Safety

This recorder is compliant with the requirements of EN61010-1, UL 61010C-1 & CSA C22.2 No. 1010.1-92. The protection provided by the recorder may be impaired if it is used in a manner inconsistent with its intended purpose, or in an environment that exceeds the specifications of the recorder. Chromalox, Inc.. is not liable for the user's failure to comply with these requirements.

Safety Symbols

The following symbols may be seen on the recorder labeling.

Protective Earth Ground

DC Supply

Safety Notes and Precautions

1. The protective earth ground terminal should be connected first, before any other connection is made. To avoid dangerous conditions, any interruption to 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 to the recorder or errors in measurement.

4. Disconnect power prior to any maintenance or repair in order to avoid personal injury and/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 a 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.

Static Electricity

Appropriate precautions must be taken when handling the recorder. The circuit board and components are susceptible to damage caused by electrostatic discharge. Take static electricity precautions while handling and inserting the Compact Flash Card into the recorder.

To replace the power-line fuse

The power-line fuse is located within the fuse-holder on the power board. For 90-250 VAC line voltages, the user must use a 2.5A time-lag fuse, and for either 11-18 VDC or 18-36 VDC line voltages, a 5.0A time-lag fuse must be used.

1 General Description

1.1 ECR1 Features

- 6.1" TFT Color LCD with VGA Display in 640x480 pixels

- 18 isolated Analog Inputs

- Plug & Play I/O cards for easy expansion

- Simple and friendly operation

- Infrared detector to prolong lifetime of LCD

- Solid storage media CF card in high capacity

- 174 mm short depth

- Ethernet communications as standard and optional RS-232/422/485 available

- High accuracy 18-bit A-D Analog Input

- 15-bit D-A Analog Output

- 200 milli second sample rate

- Bench top with convenient portable handle, easy converted into panel mount

1.2 Ordering Codes and Accessories

Ordering codes

Model **ECR1 Electronic Chart Recorder Basic Configuration**

ECR1	Code	Power										
	4	90-250 VAC, 47-63 Hz										
	6	11-18Vdc										
	7	18-36Vdc										

		Code	**Analog Input Card**
		0	None **B** 12 Channels (4 Cards*)
		3	3 Channels (1 Card*) **C** 15 Channels (5 Cards*)
		6	6 Channels (2 Cards*) **D** 18 Channels (6 Cards*)
		A	9 Channels (3 Cards*)

			Code	**Digital Input Card**
			0	None
			1	6 Channels (1 Card*)
			2	12 Channels (2 Cards*)

				Code	**Digital Output Card**
				0	None
				1	6 Relays (1 Card*)
				2	12 Relays (2 Cards*)

					Code	**Communications**
					0	Standard Ethernet Interface
					1	RS-232/ 422/485 (three in one)* Ethernet interface

						Code	**PC Software**
						1	Free Basic Observer I for non-communication application
						2	Extensive Observer II for communication via RS-232/422/485 or Ethernet

							Code	**Firmware**
							0	Basic Function
							1	With Mathematics, Counter and Totalizer Functions

								Code	**Storage Media**
								1	32MB Compact Flash Card (CF)
								4	256MB Compact Flash Card (CF)

									Code	**Case/Mounting**
									1	Standard Panel Mount
									2	Bench Top / Portable Style with Handle

										Code	**Special Option**
										0	None
										1	24Vdc Auxiliary Power Supply (for Transmitter, 6 Channels)
										2	3-Channel Analog Output
										3	6-Channel Analog Output
										4	8-Channel Analog Output
										5	Panel Mounting with Power Plug
										6	Panel Mounting with Power Switch

ECR1	- 4	A	0	0	0	1	0	1	1	0	**Typical Model Number**

* Standard model without options, ECR1-4A00010110.
* The rear slots of the recorder will only accept up to 6 cards in any combination.

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Accessories:

Part No.	Description
AI181, AI182, AI183	1, 2, 3-channel analog input card (TC, RTD, +mA, +V, +mV)
AI181V, AI182V, AI183V	1, 2, 3-channel voltage input card (± mA, ± V, ± mV only)
DI181	6-channel digital input card
DO181	6-channel relay output card (AC/DC)
AP181	24 VDC auxiliary power supply card for 6 transmitters
CM181	RS-232/422/485 + Ethernet communication module
CM182	Standard Ethernet communication module
PM181	90-250 VAC, 47-63 Hz power supply
PM182	11-18 VDC power supply module
PM183	18-36 VDC power supply module
PM184	90-250 VAC, 47-63 Hz power supply with power plug
PM185	36-72 VDC 47-63 Hz power supply
PM186	20-28 VAC power supply
MK181	Panel mount assembly kit (grey color)
MK181B	Panel mount assembly kit (black kit)
MK183	Bench top / portable handle assembly kit (grey color) with USA Cable
MK183B	Bench top / portable handle assembly kit (black color) with USA Cable
MK184	Bench top / portable handle assembly kit (grey color) with Europe Cable
MK184B	Bench top / portable handle assembly kit (black color) with Europe Cable
CF032	32MB compact flash card
CF256	256MB compact flash card
CF1000	1GB compact flash card
AS181	Basic PC software **Observer I**
AS182	Extensive PC software **Observer II**
AO183I	3-channel current output card
AO183V	3-channel voltage output card
BT181	Boot ROM without Math, Counter & Totalizer
BT182	Boot ROM with Math, Counter & Totalizer
SC181	Slot cover of an empty slot
SNA10A	RS-485 to RS-232 converter
UMECR1	User Manual

Notes:

• The rear slots of the recorder will only accept up to 6 optional cards of input, output or 24 VDC power supply in any combination. For example, 12-channel analog input needs 4 pcs. of 3-channel analog input cards AI183. Two empty slots would be available for other cards.

• The basic PC software "Observer I" is supplied free recorder. There is an additional charge for the extensive PC software "Observer II" which is required for communication via RS-232/422/485 or Ethernet.

1.3 Expandable Input and Output Cards

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

Analog Input cards (part number AI181, AI182, AI183): These three cards are used for 1, 2 & 3-channel analog input. Each input is isolated from each other to avoid noise and to ensure stable measurement. Analog input is configured by DIP switches and jumpers on the card before plugging into rear expansion slot. Refer 2.3 Setting Input and Output Cards.

Digital Output card (DO181): Each card includes 6 alarm relays. Contacts are rated 5 Amp/240 VAC

Digital Input card (DI181): Each card includes 6 channels. Logic Low: -5V minimum, 0.8V maximum, Logic High: -2V minimum, 5V maximum

1.4 Storage Media CF Card

The Compact Flash Memory Card (CF Card) is an open standard media that is used with this instrument. Its compact size, anti-dust and anti-vibration features increase its reliability in the field. The purpose of the CF card is to transfer temperature data and recorder configuration to and from a PC for permanent storage and analysis. To read the measured data from a CF card to a PC, add a CF card reader to the USB port of a PC. Higher capacity 64 and 128MB CF cards are available upon request. Alternatively the user may purchase these locally. To ensure compatibility, we recommend only two brands, **SanSisk** and **Transend**.

First Time Use
To read the ECR1 configuration and measured data for the first time, it is necessary to press "SAVE" key under the configuration menu of the recorder. This saves the setup of your ECR1 recorder and prepares it to be transferred to a PC. Once the ECR1's configuration is saved to the card, then any measured process data can be dumped onto the card by pressing the "DUMP" Key. Once measured data and configuration are saved onto the card, the card can then be inserted into a CF card reader connected to a PC with Observer software running. Any time the configuration of the ECR1 is altered, it is important to save the changes to the CF card and then to the PC. After initial configuration is saved, the "DUMP" key is all that is needed to send process data to the CF card.

Data Storage Formula
The equation below will help you determine how often a CF card must be dumped to a PC before it is full. Each data sample consumes 2 bytes of the CF card's memory. The portion of the equation in parenthesis must be figured for each input channel, and added together if multiple channels are being recorded.

The # days = CF Card capacity / (2 Bytes x seconds per sample x 3600 x hours of operation per day)

Example: A 16 megabyte CF card with a set log speed of 1 sample / second which runs 8 hours will last 277 days. 16MB / (2x1x3600x8) = 277

1.5 Infrared Detector (IR Detector)

Infrared technology on the ECR1 recorder is used to prolong the lifespan of the LCD display. The IR detector on the front of the ECR1 senses body heat to a distance of approximately 2 meters away. This feature works together with the screensaver to de-energize the screen after a period of inactivity. The detector senses when a user approaches the recorder and automatically re-energizes the LCD display. This function can be disabled if desired.

2 Installation and Wiring

2.1 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 use.

2.2 Installation

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

The recorder is designed for indoor use and not in hazardous areas. It should be kept away from shock, vibration, and electromagnetic fields such as variable frequency drives, motors and transformers.
The ECR1 peperless recorder is intended for operation in the following environment:

Pollution Degree Level II	IEC1010-1(EN61010-1)
Temperature	5 ~ 50°C
Humidity	20 ~ 80% RH (non-condensing)
Power	90 ~ 250 VAC, 50/60 Hz, 11-18 VDC or 18 - 36 VDC

Panel Mounting Style
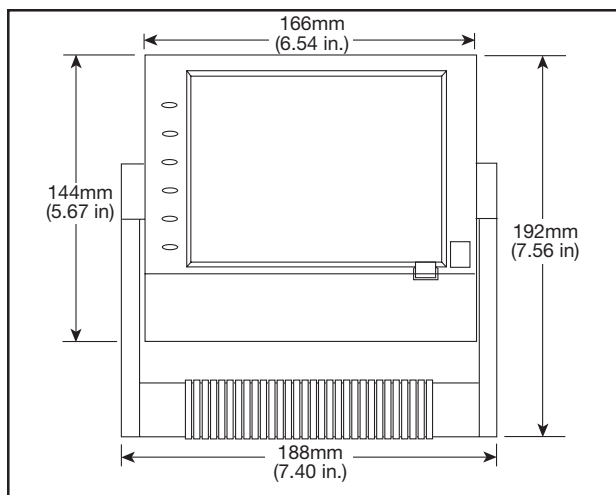
Figure 2 - 1
The front side
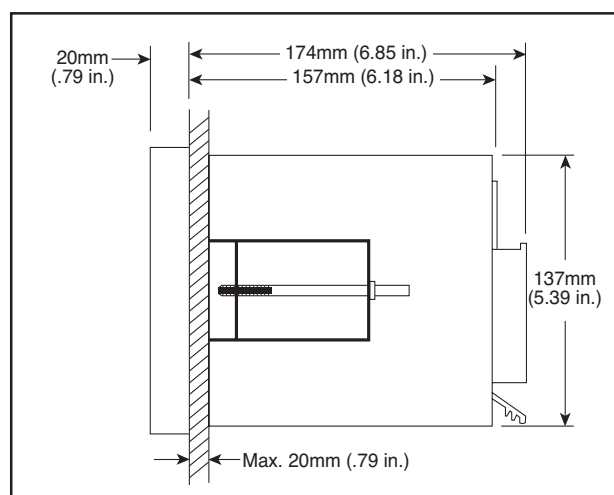
Figure 2 - 2
The right side
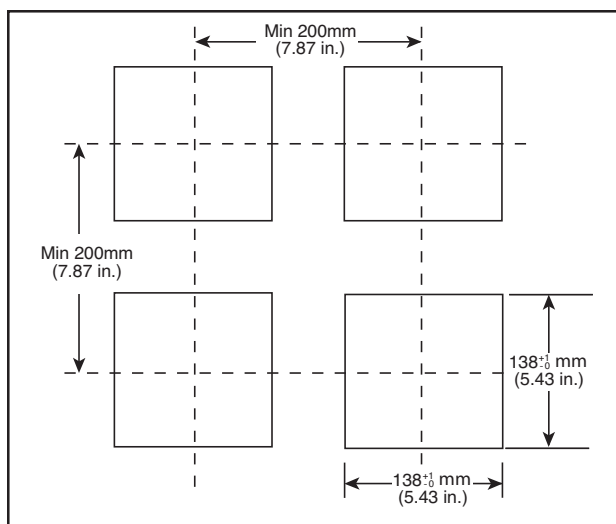
Figure 2 - 3
Panel Cutout
(standard DIN size 138 mm x 138 mm)

Note:
- Do not over-tighten mounting clamp screws as it could result in distortion of the case.
- There is no mounting angle restriction.

Bench Top / Portable Style

For use as a portable bench top assembly. The portable kit MK184 should include two ears, one handle and two feet. Assemble as follows:

First, put the right ear FV-R on the right hand side of the metal case, and slide it into the case by pushing it in the direction shown in **Figures 2-4 through Figure 2-8.** Ensure that the ear is firmly plugged into case. Do the same with the left ear FV-L.

Figure 2 - 4
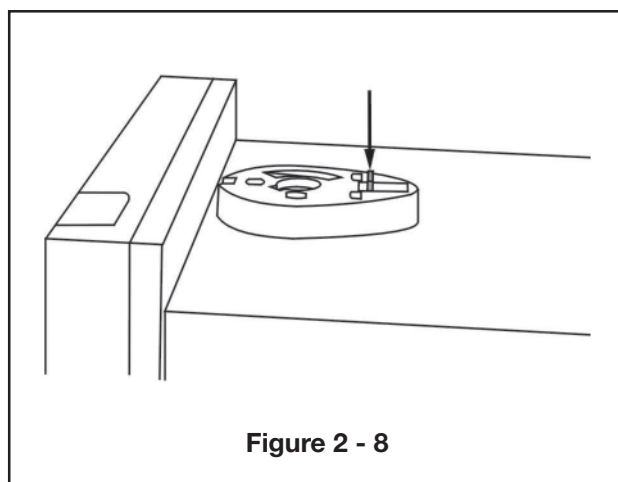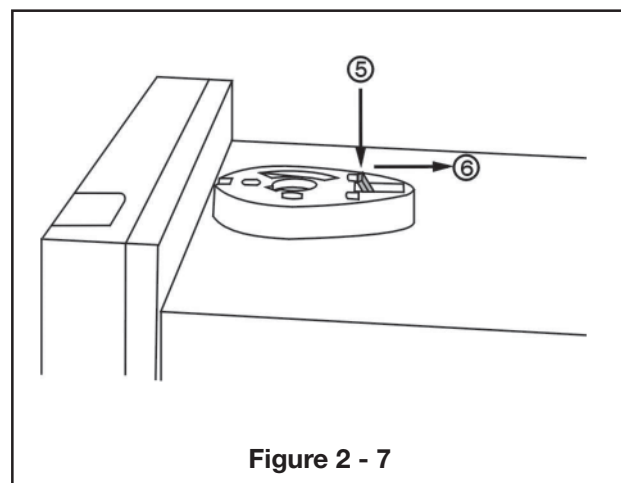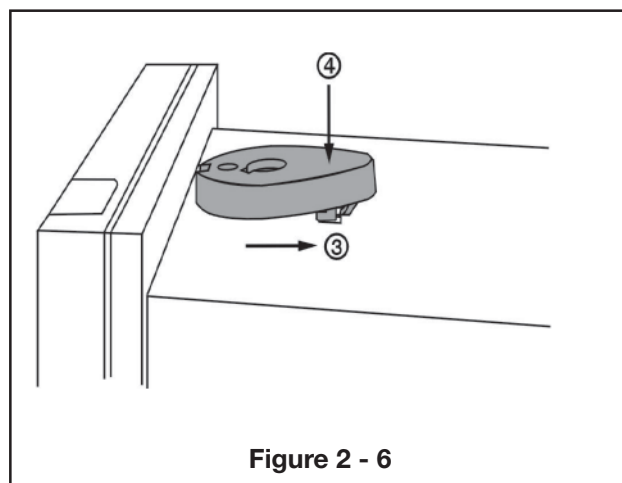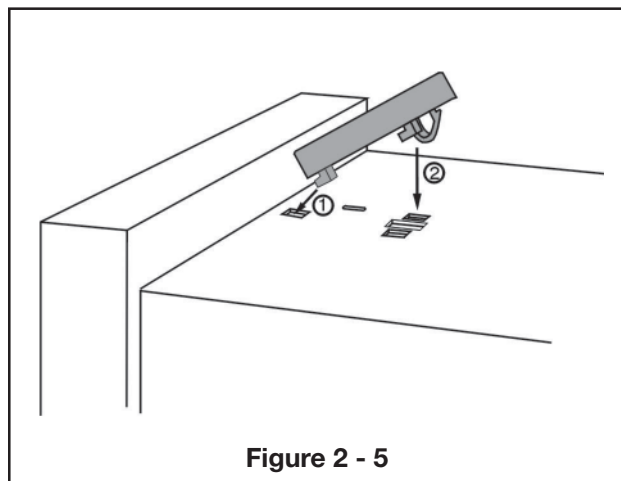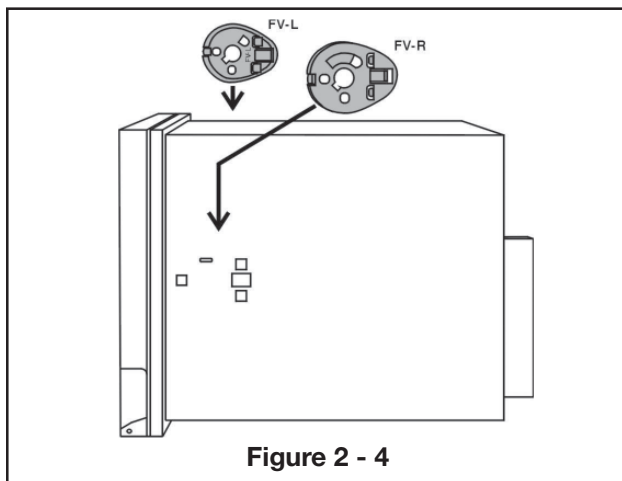
Figure 2 - 5

Figure 2 - 6

Figure 2 - 7

Figure 2 - 8

Holding the handle so that the instruction side is visible, pull the handle outward using both hands and put it in a vertical position on top of the case. Then, slide the handle into both ears as **Figure 2-9** illustrates. Rotate the handle downward as shown in **Figure 2-10 & 2-11.** Lastly, slide both feet beneath the case and straighten up the stoppers as shown in **Figure 2-12 through Figure 2-14**. The bench top recorder is now mechanically ready.
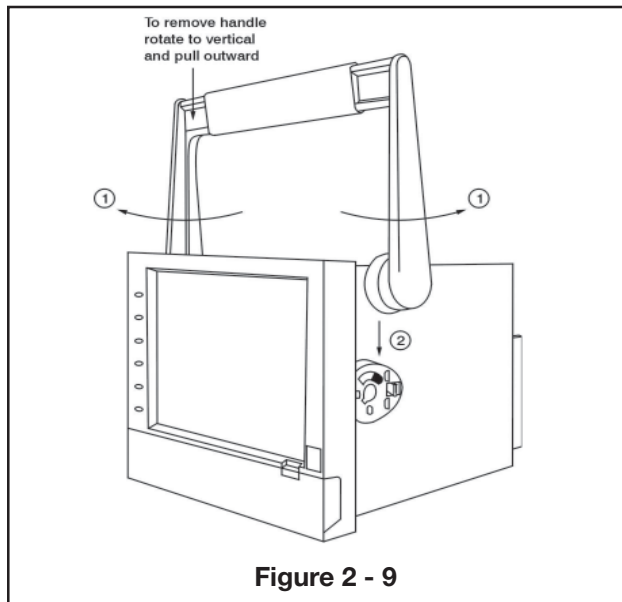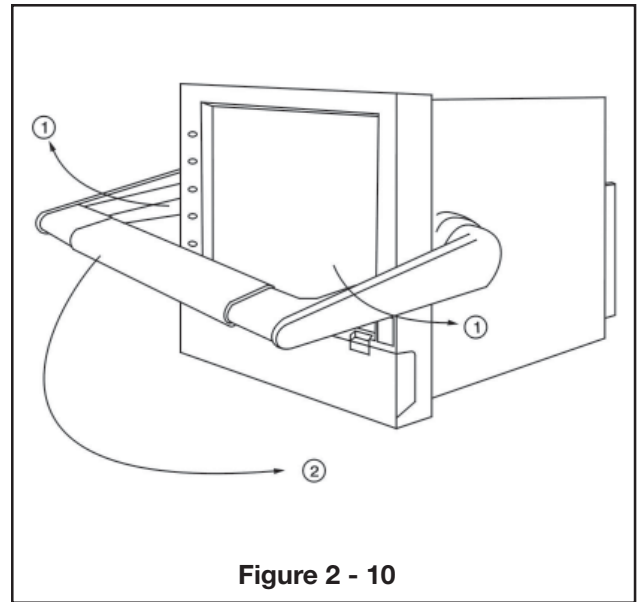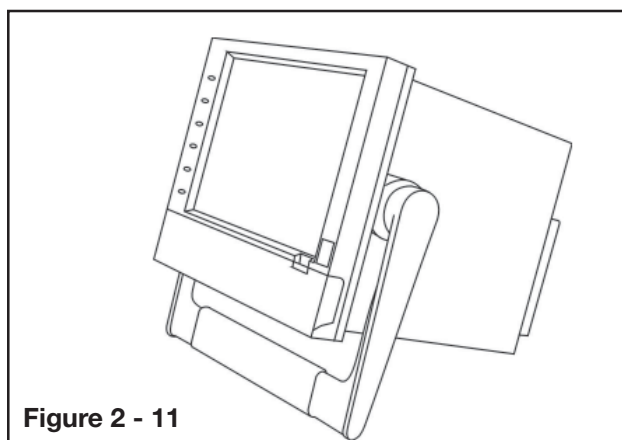
Figure 2 - 9

Figure 2 - 10

Figure 2 - 11
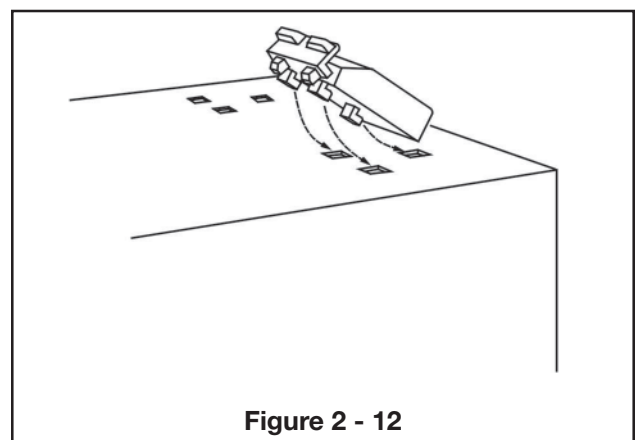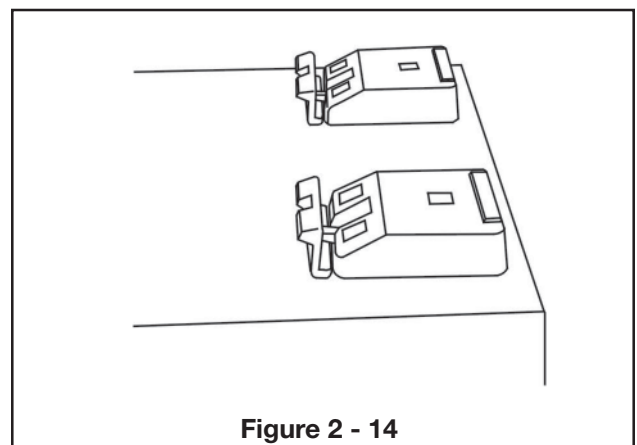
Figure 2 - 12
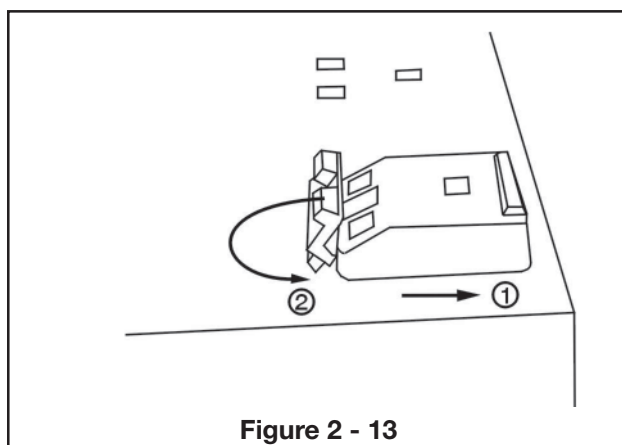
Figure 2 - 13

Figure 2 - 14

Note:
To change the bench top into panel mount. Disassemble kit MK184 (one handle, two feet, and two ears) in reverse of above, then fit the mounting clamps.

2.3 Setup input, output & 24VDC power supply cards

JUMPER AND SWITCH SETTING			MINI-JUMPER			DIP SW SETTING								V1.9 OTAI18ZC
FUNCTION			J1	J2	J3	1	2	3	4	5	6	7	8	■ = SW ON ☐ = SW OFF
UNIT	°C	T/C or RTD		■										
	°F	T/C or RTD		■		■								
	mV	0 ~ 60mV		■							■			
		0~1000mV	■					■			■			
	V	0 ~ 5V		■					■		■			
		1 ~ 5V		■				■	■		■			
		0 ~ 10V		■							■			
	mA	0 ~ 20mA			■		■	■			■			
		4 ~ 20mA			■		■	■			■			
THERMOCOUPLE		J					■							
		K						■						
		T					■	■						
		E							■					
		B					■		■					
		R						■	■					
		S					■	■	■					
		N								■				
		L					■			■				
		TC1						■		■				
RTD		PT100							■	■				
		JPT100						■	■	■				
		RTD1					■		■	■				

3-wire RTD   2-wire RTD   0~60mV, T/C   0~1000mV, V, mA

Figure 2 – 15

Analog input card (part numbers AI181, AI182, AI183)
AI181, AI182, AI183 are analog input cards with 1, 2 or 3 channels respectively. Each card includes universal TC inputs (J, K, T, E, B, R, S, N, L), PT100, mV, mA and V. To select a specific input, first set jumpers and switches according to the sticker information on the card as shown in **Figure 2–15**, and plug it into the rear slot. Then, turn on the power to the unit. The recorder will automatically detect the card and display the specific input type, then show its source of a specific slot in Configuration Mode. All inputs were initially set for 4-20mA from the factory.

Digital Output card (DO181) / 6 relay alarm card
The digital 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 the specific slot in **System Info** mode while doing the configuration. To set up the digital output card, please refer to **Event, Job** in **Section 4.1** of this manual.

Digital Input card (DI181)
This card includes 6 event input channels 1, 2, 3, 4, 5 & 6. As above, plug the card into rear slot and turn the power on. The recorder will automatically detect the card, and then display the input type and its source of the specific slot in **System Info** mode while doing the configuration.

24 VDC auxiliary power supply card (AP181)
This card can supply power to 6 transmitters. The output rating is 24 ± 1 VDC, 30mA each channel.

2.4 Wiring for the cards

⚠️ **Wiring Precautions**

1. Care must be taken to ensure that the maximum voltage rating specified on the label is not exceeded.
2. For the panel mounting version, it is recommended that an external fuse and an external switch rated at 2A/250 VAC are installed near the recorder.
3. Beware not to over-tighten the terminals screws. The torque should not exceed 1 N-m (8.9 Lb-in or 10.2 Kg F-cm).
4. Except the thermocouple wiring, all wiring 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.

Note:
- The six rear slots will accommodate a total of six cards maximum. It can be any input, output or 24 VDC auxiliary power supply card.
- 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.
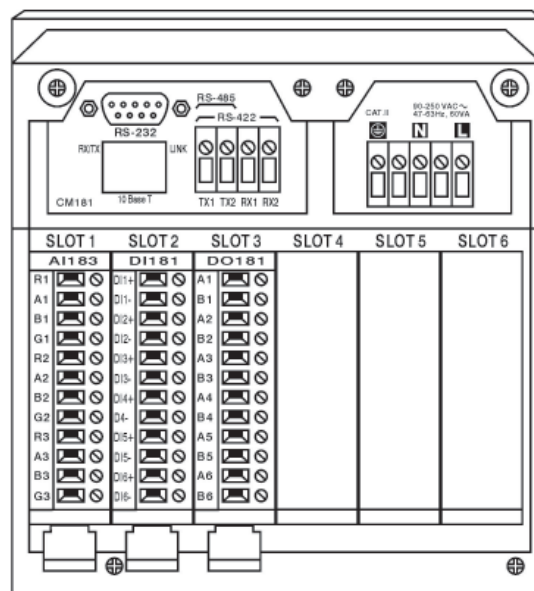
Figure 2 – 16
Rear terminals
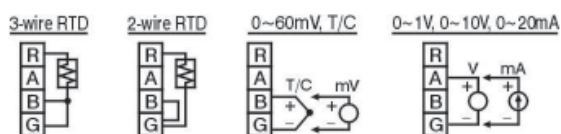
Figure 2 – 17
Analog input card (AI181, AI182, AI183)
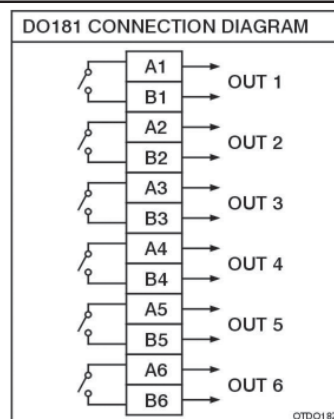
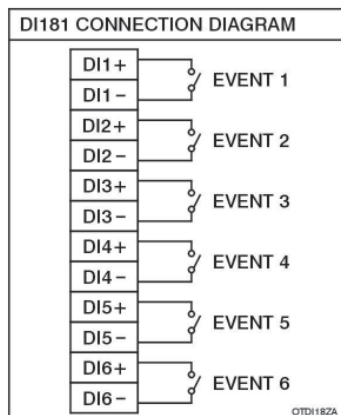**Figure 2 – 18**
Digital output card (DO181)
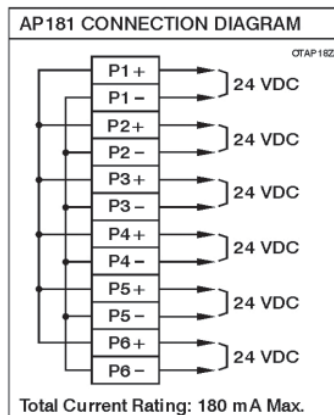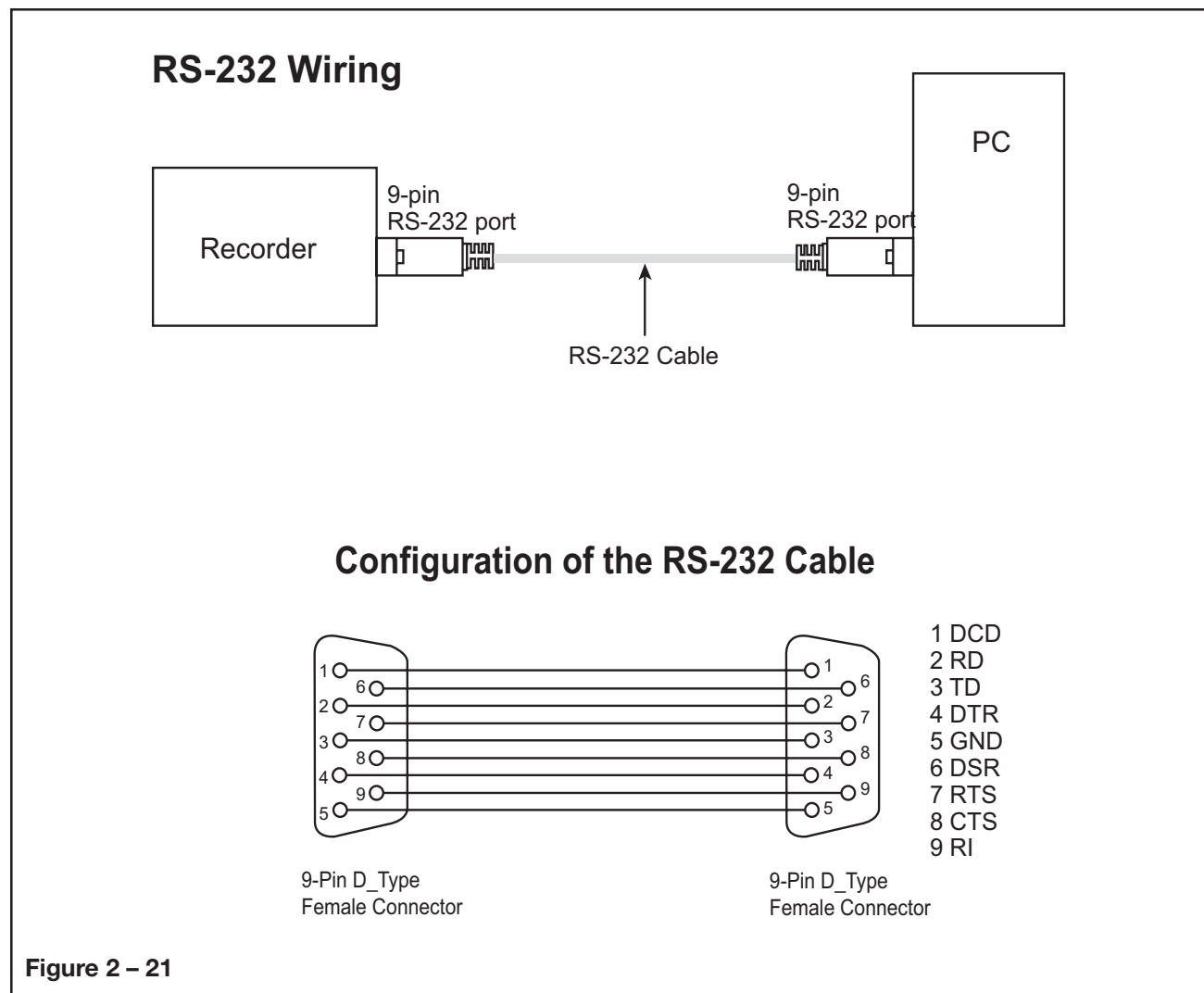

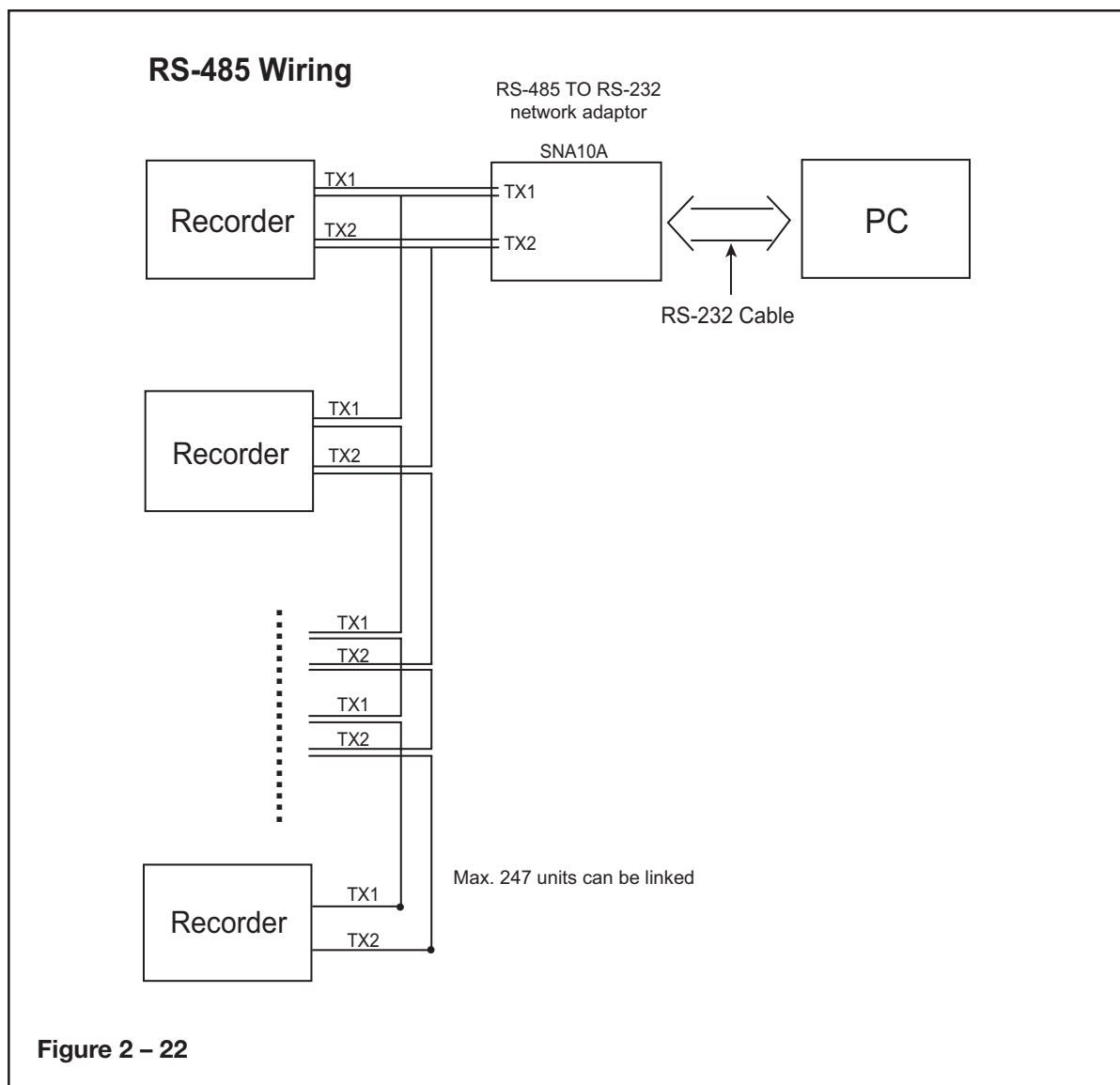**Figure 2 – 19**
Digital input card (DI181)

Figure 2 – 20
24 VDC auxiliary power supply card (AP181)

RS-232 Wiring

Recorder

9-pin
RS-232 port

PC

9-pin
RS-232 port

RS-232 Cable

Configuration of the RS-232 Cable

1 DCD
2 RD
3 TD
4 DTR
5 GND
6 DSR
7 RTS
8 CTS
9 RI

9-Pin D_Type
Female Connector

9-Pin D_Type
Female Connector

Figure 2 – 21

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RS-485 Wiring

RS-485 TO RS-232
network adaptor

SNA10A

Recorder — TX1 / TX2

TX1 / TX2

RS-232 Cable

PC

Recorder — TX1 / TX2

TX1 / TX2

TX1 / TX2

Max. 247 units can be linked

Recorder — TX1 / TX2

Figure 2 – 22

2.6 Installation of a Compact Flash (CF) Card

A 16MB Compact Flash Card is installed in each recorder. If a bigger capacity Compact Flash card is required, and the user decides to buy it locally, please check the brand name of CF card. To be compatible, it should be one of two recommended brands, **SanDisk** or **Transcend**. Other brands are not compatible.

Installation: First, fully insert Compact Flash card, then turn the stopper to the right.

Removal: First turn the stopper to the straight direction, then pull out the CF card.

Note:
To read measured data and events on a CF card, it is necessary to install Observer I or II software on a PC first. Then, connect a CF reader to the USB port of a PC. Finally, insert the CF card into the reader.

3 Basic Operation

Figure 3 – 1

After installation and wiring, turn on the power to the recorder. Six soft keys: **Page, Mode, History, Event, Status** and **Exit** will appear on the left side of the LCD display. When the plastic cover at the front of the recorder is opened, the user will find another set of five soft keys: **Dump, Clear, Operate, Config** and **Shutdown**. These are the eleven soft keys used for operation. In the top right corner, small icons of **buzzer, evnt, mem, CF** and **Date/Time** display ECR1 status.
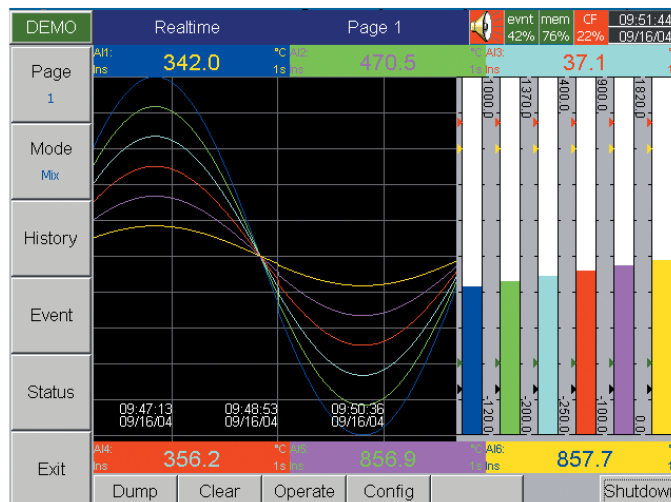
Soft keys:

3.1 Page

The page key allows the user to page through multiple screens such as the one above (Fig. 3-1). The recorder can have a maximum of 6 Pages and each Page can display a maximum of 6 channels. A channel can display either measured data or computed measured data. Press the **Page** key, to move forward from Page 1 to Page 2, in order to display any additional data.

3.2 Mode

The Mode key defines the type of display. The options are Mix, Trend, Bar or Digital mode.

Mix: The default display is Mix mode. Several modes can be mixed together including horizontal/ vertical trend, bar and digital modes.

Trend: Press the Mode key to display Trend mode. This is measured data trend in real time. The same page/ display may have a maximum of 6 trends in different colors. The user may define each color (details in **Section 4.2 Display.**)

Bar: Press the Mode key again in order to display the bar mode shown in different colors. The scale of each bar can be defined individually, as detailed in **Section 4.2 Display**.

Digital: Press the Mode key again in order to display the digital process readouts in different colors. Press the Mode key again to return to the original Mix mode.

3.3 History

Press the **History** key to display a historical trend. Press the directional keys ⬅ ➡ to move backward or forward. Press **Zoom** key to zoom in the time scale. It may be zoomed in for 9 minutes, 1 hour, 12 hours, one day or one week. Press **Back** key to return to the original display.

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3.4 Event

Press the **Event** key and the Event / Alarm List will display general Events, Alarms and Reports. Press the **Mode** key to toggle between an Evnt/Alarm (Event/ Alarm) screen or a Report screen.

Event/Alarm

The Event / Alarm screen displays information on the Type, Source, Active time, Clear time and Value of events or alarms. Use the directional keys ⬇ ⬆ to move downward or upward. Press the **Ack All** key to acknowledge all alarms. Events do not need to be acknowledged. Press the **Back** key to return to the original display.

Figure 3 – 2

On the Event / Alarm List, three different colors indicate the status of alarms.
- Red - Presently in alarm status.
- Green – The cause of alarm status was temporary, and has now returned to normal.
- Grey – A temporary alarm (in green status), after having been acknowledged, then becomes grey.

The Active Time Column displays the time that an alarm status became active. **Clear Time** displays the time when the two following conditions are met. First, the alarm status is cleared and becomes normal, and second, the user has acknowledged the alarm. Once an alarm occurs, the red buzzer icon on the top right starts flashing. Once the alarm condition has expired and the alarm is acknowledged, then the red buzzer icon disappears. When the Clear Time column shows **Terminated** this indicates that the alarm has been terminated by turning off the power.

Report

Press the Mode key to choose the Report Function. This produces Counter and Totalizer reports (when used). Press the Report key to select the report on a daily, weekly or monthly basis. Press directional keys ⬅ ➡ to choose the exact day, week or month.

Figure 3 – 3

3.5 Status

The Status key brings up a list that displays the ***present status*** of Digital Inputs (DI), Digital Outputs (DO) Alarm Relay and the Counter and Totalizer. Press the **Mode** key to choose either DI, DO, Counter or Totalizer. This display shows the DI, DO, Counter or Totalizer status ***at the present time***.

3.6 Exit

Press the Exit key to close the existing operation, the soft keys on the left hand side will disappear giving a full display. Press any soft key on the left hand side, and the six soft keys: **Page, Mode, History, Event, Status** and **Exit** will appear again. Open the plastic cover at the front lower side of recorder, then another set of five soft keys **Dump, Clear, Operate, Config & Shutdown** appear.

3.7 Dump

Before removing the CF card from the recorder, it is necessary to press the **Dump** key to transfer the measured data and events from the internal memory of the recorder to the CF card.

3.8 Clear

When the internal memory is down to 25%, the mem icon on the top right changes color from green to red. Also, when the internal memory reserved for events is down to 25%, the evnt (event) icon on the top right changes color from green to red. In each case the user should transfer all measured data from the recorder to the CF card by pressing the **Dump** key as above. However, if the measured data and events are not significant information, the user may also press the **Clear** key to clear them.

3.9 Operate

Press the **Operate** key to start a job manually. For example: to record the alarm by selecting Log alarm. There are various jobs that may be assigned, as described in **Event**, **Job** of **Section 4.1 Channel** of this manual.

3.10 Config

Details about the soft key **Config** are described in **Section 4 Configuration**.

3.11 Shutdown

Accidental turning off the power will cause loss of data and will interrupt the operation of the recorder. Therefore press the **Shutdown** key to shutdown the system first before turning off the power.

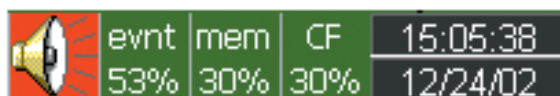## 3.12 Small icons (on the top right hand side):

Figure 3 – 4

Buzzer: Appears by flashing in red whenever an alarm status occurs. The buzzer will disappear after the user acknowledges the alarm, or the process becomes normal.

Evnt: The percentage of memory space left for events/alarms. For example, evnt 84% means 84% of memory space is remaining for events/alarms. Refer to Event/Alarm Limit in **Section 4.4 Instrument**. Various numbers of events/alarms can be set. The icon flashes red when memory space is down to 25 %. The icon returns to normal (green) after pressing the soft key, either **Dump** or **Clear**.

mem: The percentage of memory space left for measured data. The icon starts flashing red when the memory space is down to 25%. The icon becomes normal (green) after pressing the soft key either **Dump** or **Clear**. *If the internal memory goes down to 10 %, the earliest (oldest) measured data and events will automatically be saved to the CF card in small batches automatically. If no CF card is inserted, then the earliest (oldest) measured data and events will be overwritten and replaced by the latest measured data and events.*

CF: This icon shows the status of the Compact Flash card. If a CF card is not inserted, the icon shows a red-cross sign. If it is properly inserted, then the icon displays as normal (green) and indicates the percentage of memory space left on the CF card. The icon starts flashing in red when the available memory space goes down to 25%. The icon returns to normal (green) after downloading data and events from the CF card to the PC. If the CF card is inserted in the recorder and its memory is full, then the memory of CF card remains unchanged and the earliest (oldest) measured data and events on the recorder's internal memory will be overwritten and replaced by the latest measured data and events.

Date/Time: To set the local time, please refer to **Section 4.5 Clock.**

4 Configuration

Figure 4 – 1

Press the **Config** key to enter the Configuration mode. The following buttons appear: **Channel, Display, Tools, Instrument, Clock, System Info** and **Demo**. Meanwhile, the following soft keys appear at the bottom: **Save, Load, Default** and **Back**.
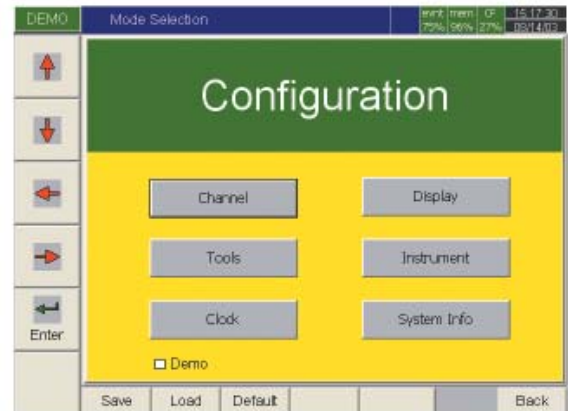
Soft Keys

Enter: First select the mode by pressing directional keys ⬅ ➡ then press **Enter** key to enter any mode of Channel, Display, Tools, Instrument, Clock, System Info or Demo.

Save: This saves the ECR1 configurations from the recorder to the CF card. *To read the configuration and measured data from a CF card on a PC for the first time, or any time configuration has been changed, it is important to press the Save key to save ECR1 configuration changes to the CF card beforehand.*

Load: Load configuration from storage media CF 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.

Back: Go back to the previous display.

4.1 Channel

After entering the Configuration mode, select **Channel** and press the **Enter** key to get into Channel mode. Press the **AI, DI** or **Math** keys to edit the Analog input, Digital input or Mathematics setup. The directional keys < > at the bottom allow the user to select a single channel. Press the directional keys ⬅ ➡ on the left side to select specific fields. *After Configuration 4.1 to 4.6, press Back key to return to real-time display, all configuration changes will be automatically saved.*

Name: This field defines the name for each channel. The name is restricted to six characters. Press **Enter** and a keyboard will appear. **BackSP** key means backspace, **Select** key means to select a character or number, **Caps on** means characters in capital, and **Caps off** means characters not in capital.

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

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

Figure 4 – 2

> **Disable:** Select Disable while a specific channel is not required at this time.

> **Instant:** Logs in the latest data measured at the selected sampling interval

> **Average:** Logs in averaged data measured at the selected sampling interval

> **Minimum:** Logs in minimum data measured at the selected sampling interval

> **Maximum:** Logs in maximum data measured at the selected sampling interval

Log Speed: The speed or frequency at which data is measured: 1, 2, 5, 10, 30, 60 or 120 seconds.

Offset: The value used to correct sensor input error.

Gain: A multiplier used to correct sensor error. Value correction = (the process value + offset) x gain

Input: Displays the type of sensor that is configured through DIP switch configuration. (V, mV, mA, T/C, (J, K, T, E, B, R, S, N, L), PT100, JPT100)

Unit: The engineering unit of input.

Range: Various input ranges can be set for voltage and current. Options are 0-1, 1-5, 0-5 or 0-10 V for voltage, and 0-20 or 4-20mA for current.

Scale:

> **Scale Unit:** Defines a unit of measure.
> **Scale Low:** Defines low scale with decimal if necessary. For instance, input 0-10 V, the Scale Low can be set up with value 0.00 to be correspondent to low range 0 V.
> **Scale Hi:**   Defines high scale with decimal if necessary. For instance input 0-10 V, the Scale Hi can be set up with value 100.00 to be correspondent to high range 10 V.

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Event

The Event is frequently used for Alarm purposes. Event can also be used for Digital Output (DO), Timer, Totalizer, Counter or Report functions.

Type: There are various event configurations that can be selected for an Alarm or job purpose.
Choices are H, L, HH, LL, R or r.

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

 L: Low limit. When the process drops below low limit, the alarm or job is actuated

 HH: High high limit, sets up another limit higher than high limit for double warning.

 LL: Low low limit, sets up another limit lower than low limit for double warning.

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

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

Setpoint: A fixed value for actuating Job1 and /or Job2.

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 the event of high temperature. Each pen can accept four events (or alarms) and each event can create two jobs. Please note that a job under an 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.

 Various types of jobs can be selected:

No Action: Do nothing.

Log Alarm: Record alarms.

Log Event: Record events.

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

DO Latch On: Set digital output / relay on, and then select Target from 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 from 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 from 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 from Timer 1 to Timer 6.

Disable Timer: Stop the timer, and then select Target from Timer 1 to Timer 6.

Preset Totalz: Start the totalizer with a preset value, then select Target from Tolz 1 to Tolz 6.

Reset Totalz: Reset totalizer to zero, and then select Target from Tolz 1 to Tolz 6.

Enable Totalz: Start the totalizer, then select Target from Tolz 1 to Tolz 6.

Disable Totalz: Stop the totalizer, then select Target from Tolz 1 to Tolz 6.

Preset Counter: Start the Counter with a preset value, then select Target from Cont1 to Cont6.

Reset Counter: Resets the counter to zero, and then select Target from Cont1 to Cont6.

Inc Counter: Increase the counter, and then select Target from Cont1 to Cont6.

Dec Counter: Decrease the counter, and then select Target from Cont1 to Cont6.

Log Report: Make the report for Counter and Totalizer. Choose this column, and then the report will be presented as details described in section **3.4 Event.**

Note:
The internal sampling rate of the recorder is fixed at 200 milli seconds. i.e. the ECR1 samples data 5 times per second. If the logging speed is set at 1 second in Instant mode, the recorder logs using the last of five measured data values. For the same speed in Averaging mode, the recorder logs using the average of the five measured data values. For the same speed in the Maximum or Minimum mode, the recorder then logs using the maximum or minimum of the five measured data values.

Sampling		Logging (historical trend)	Display (real time)
Instant	200mS	the last of 5 measured data	the last of 5 measured data
Averaged	200mS	the average of 5 measured data	the last of 5 measured data
Maximum	200mS	the maximum of 5 measured data	the last of 5 measured data
Minimum	200mS	the minimum of 5 measured data	the last of 5 measured data

_ ***Press Back key to return to real-time display, all configurations will be memorized***

4.2 Display

Press the **Back** key to return to the beginning of the Configuration mode. Select **Display** and press **Enter** to get into the Display mode. Each display may have a maximum of 6 pages and each page may display a maximum of 6 channels.

Mode: Defines the method of displaying data. Options are: Mix, Trend, Bar or Digital modes.

Trend Dir: Selects the trend direction: horizontal or vertical.

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

Pen: Defines a drawing pen for each specific channel. It's color, width, Display Hi and Display Lo can be altered.

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

Color: Selects the color for each pen.

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

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

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

StatusBar: For convenience, when viewing the status of the Totalizer, Counter, DI or DO., the user may enable these items to appear in the StatusBar. For example, after enabling Totalizer 1_3, an extra bar will appear at the lower part of display which displays the values for Totalizers 1, 2 and 3.

Figure 4 – 3

Figure 4 – 4

Note:
• To illustrate the difference between DisplayHi, DisplayLo and Scale Hi, Scale Low. Here is a typical example, with input 0-10V, Scale Low=0.00, Scale Hi=100.00, to show higher resolution, set DisplayLo=0.00, DisplayHi=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 DisplayHi, or DisplayLo.
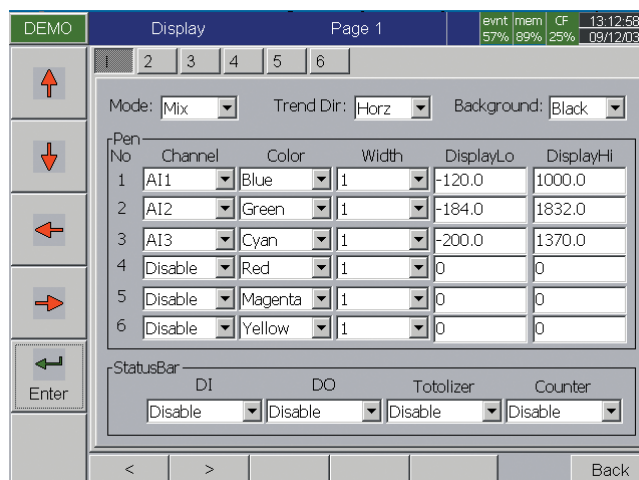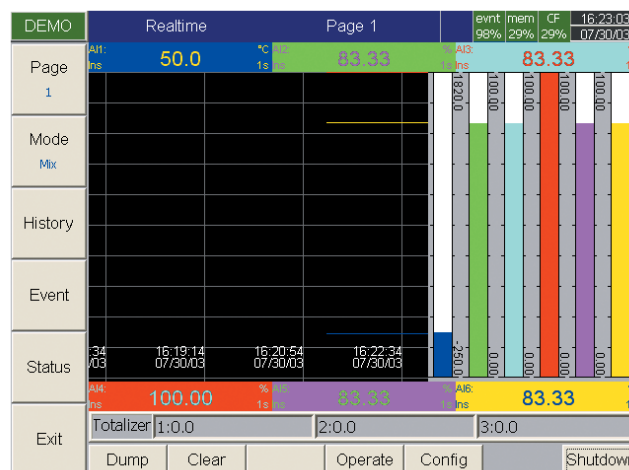
4.3 Tools (Timer, Counter & Totalizer)

Press the **Back** key, to return to the Configuration mode. Select **Tools**, then press **Enter** key to get into Tools mode. Timer, Counter and Totalizer are defined here. *Counter and Totalizer are available only if the options of Math, Counter & Totalizer have been selected.*

Timer
Press directional keys < > at the bottom to select between 6 available timers.

Type: Countdown, Repeat Countdown, Daily, Monthly or Weekly Countdown: Defines the interval of time, e.g. days, hours, minutes and seconds. (not Real Time) Repeat Countdown: Repeats the previous countdown. Daily, Weekly or Monthly: The timer works in selected intervals of Real Time.

Action: Disables or enables the timer.

Job1, Job2: various jobs as described in **Section 4.1 Channel,** 2 jobs for each timer.

Figure 4 – 5

Counter
Press directional keys < > at the bottom to select from 6 available counters.

Name:	Defines the name of counter.
Desc:	Defines the description for a specific timer on the display.
Unit:	Defines the unit of timer
Preset:	Defines the preset value for the counter. The counter starts from a preset value.
Event:	Defines the type, setpoint, Job1 or Job2.
Type:	Select one of three options: None, Process Hi, Process Low
Setpoint:	Defines the set point of process value to trigger the counter.
Job1, Job2:	Various jobs as described in **Section 4.1 Channel**, 2 jobs for each counter

Figure 4 – 6

Totalizer

Press directional keys < > at the bottom to select from 6 available totalizers.

Name: Defines a name of the totalizer.

Desc: Defines the description for a specific totalizer on the display.

Source: Select a specific analog input or Math input to be used for totalizing.

Action: Disables or enables the totalizer.

Decimal: Defines the decimal point for the totalizer.

Period: Selects second, minute or hour rate used for the totalizer.

Unit: Defines the units used for totalizing

Preset: Defines the preset value for the totalizer. The totalizer starts from a preset value.

Type: Select one of three options: None, Process Hi, Process Low

Setpoint: Defines the set point in which to trigger a totalizer event.

Job1, Job2: various jobs as described in Section **4.1 Channel**, 2 jobs for each totalizer.

Figure 4 – 7

An example using the Totalizer: A factory operates for 8 hours a day, and the staff wishes to get the total volume of production using daily, weekly and monthly reports. First, the user needs to enter into **Tools** mode, modify the settings as follows, the totalizer will then compile from 8:30 am, and stop at 17:30 pm daily. After production has finished, the user performs the following: press the **Event** key on the left hand side, and press the **Mode** key to select **Report** mode. Finally, press the Report key to choose a daily, weekly or monthly report format.

Timer1
Type: Daily   Action: Enable
Time - Hour: 8   Min: 30
Job1: Reset Totalz   Target: Tolz1
Job2: Enable Totalz   Target: Tolz1

Timer2
Type: Daily   Action: Enable
Time - Hour: 17 Min: 30
Job1: Disable Totalz   Target: Tolz1
Job2: Log Report   Target: Tolz1

Totalizer
Name: xxxx   Desc: xxxxxxxxxxxxxxxxx
Source: AI1   Action: Enable   Decimal: 1
Period: Min   Unit: xxxx Preset: 0.0

Event

No	Type	Setpoint	Job1	Job2
1	Hi	xxxx	Log Alarm	Set DO on
2	Low	xxxx	Log Alarm	Set DO off

As an example, a report an be set up to display the following information:
The week's production volume: Monday: 990, Tuesday: 1010, Wednesday: 1020, Thursday: 1020, Friday: 980 respectively. The weekly report shows production volume 5,020.

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4.4 Instrument

The BACK key will return the ECR1 to Configuration mode. Select **Instrument** then press the **Enter** key to get into Instrument mode.

Instrument

Name: Assigns a name for the recorder.

Password: Defines a security password. (8 characters maximum). 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 configure, dump data, clear data or manually operate a job.

Storage Media:
CF card: Store historical measured data on a Compact Flash memory card. The recorder is supplied with a standard 16MB CF card, and higher capacities of 64, 128MB CF cards can be supplied on request.

Figure 4 – 8

KeypadSound: Selects the following four options: disable, minimum, medium or maximum.

DateStyle: Selects either month/date/year or date/month/year format.

Language: The English version is available, other languages will be available in a future version.

Event/Alarm Limit: Selects a high-limit of events/alarms that can be sent. Limit options are 256, 512 or 1024.

LCD:
Screensaver: To prolong the life of the LCD display, we suggest that the display turn-off time is set to 1, 10, 20, 30, 40, 50 or 60 minutes. The recorder continues to read data while it is in the Screen Saving mode. The display turns on again by pressing any soft key. When an alarm occurs, it turns on the display as well.

IR detector: The Infrared detector works with the Screensaver to protect the LCD. The Infrared detector senses the movement of body temperature when a user gets close or walks away. (Range approximately 2 meters). Operation is as follows: Set the IR Sensor to On and Screensaver at 1 Min. The display will turnoff in 1 minute after the user walks away from the recorder. Once the Infrared detector senses heat movement within 2m of the recorder, display turns on without pressing any keys on the recorder.

Note:
The IR (Infrared) detector needs to work together with Screensaver, it cannot function alone. However, the Screensaver can function alone after the IR Sensor is disabled.

Communication
PCTransfer: Selects RS-232, RS-485, or standard Ethernet communication.

RS-232, RS-485: Address: 0 to 31 nodes for RS-485

BaudRate: Selected from various Baud rates 1200, 2400, 4800, 9600, 19200 or 38400.

DataFormat: Select from one of four data formats.

Ethernet:
IP: Select **Automation** if the server on the network will automatically assign the IP address for the recorder. Select **User Define** to manually set a fixed address to the recorder. Two columns will appear for keying in fixed addresses

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

SubnetMask: Defines the correct SubnetMask address on the network

DefaultGateway: The Gateway IP address on Ethernet.

Note:
If Automation is selected, the IP address and SubnetMask are invisible. The IP address can be viewed in the System Info mode under Configuration. Because an IP address may be re-assigned a new address by the server after power is switched off and on, the user defining fixed addresses is recommended.

4.5 Clock

Press the **Back** key to return to the Configuration mode. Select **Clock** then press the **Enter** key to get into Clock (Date/Time) mode to set up the local time. After setting up the Date/Time, use directional keys to go to the **Apply** column, then press the **Enter** Key.

4.6 System Info

The system information includes System version, memory, CF card, Ethernet IP address and Slots status.

Memory (Free / Total): Indicates the percentage of free memory to total memory reserved on the recorder. 8 MB is reserved for storing measured data. A small icon on the top right indicates the percentage of free memory e.g.: mem 89 % .

CF Card (Free / Total): Indicates the percentage of free memory to total memory on the Compact Flash card.

Slot 1-6: Indicates the status of all Slots and inserted cards. The cards include Analog Input (AI), Digital Input (DI) and Digital Output (DO) (6 relay card).

Update: The Update key is located in the lower left corner. This key is used to upgrade the ECR1's firmware. Once the new firmware is downloaded to the CF card, insert the CF card into the recorder. Press the update key to begin the process. It may take a few seconds to finish the process.

Figure 4 – 9

Figure 4 – 10

4.7 Demo

The Demo mode is a simulation used for demonstration purposes. It will simulate 18 AI analog inputs, 18 Math functions, 6 DI digital inputs and 6 DO digital outputs. The trends are simulated by SIN waves. *To start the Demo mode, turn the power off and on. To stop the Demo mode and return to real mode, connected with real inputs, turn the power off and on once more.*
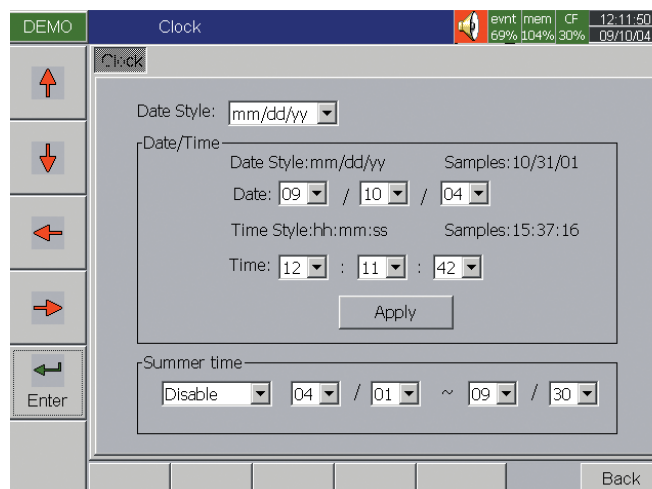
© 2006 Chromalox, Inc.
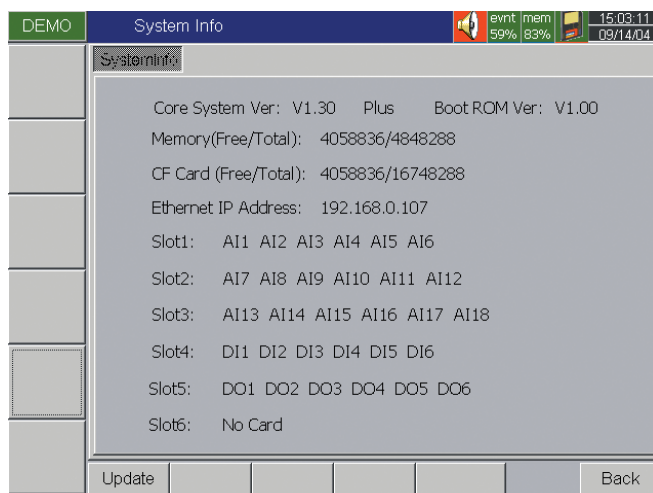
4.8 A Configuration Example

Here is a process that requires a paperless recorder with 3 channels of 4-20 mA input, 6 relay outputs and Ethernet communications for real time monitoring. With the Analog input card **AI183** not yet installed in the rear slot, set up the card to accept a 4-20 mA input according to section **2.3 Setup Input and Output Cards**. With the DIP switches now set, plug the card into SLOT1 in the rear of the recorder. Plug a 6-relay output card DO181 into the rear, SLOT2. Complete all necessary power input, output and communications wiring and installation procedures. Next, install the supplied Observer II software onto a PC which will be used for communications and monitoring. Power up the recorder. Open the front flip-down panel and six soft keys will appear at the bottom of the LCD display. Pres the **Config** key to enter the ECR1's configuration mode. Now using the arrow and enter keys to the left, select **Channel**. Configure these settings according to section **4.1 Channel**. Define the names for each channel, choose a log speed of 1S, Method: Instant, Range: 4.00 - 20.00 mA, scale unit: %, Scale low: 0.00 and scale high: 100.00. Configure the Event (alarm) to High alarm (H) for channels 1, 2 & 3 and set up Job 1 to log the alarm. Continue through sections **4.2 Display, 4.3 Tools, 4.4 Instrument** and **4.5 Clock** to finish the basic setup.

To establish ECR1 communications with an Observer II software package via an Ethernet connection a few extra steps are required. Under the **Instrument** menu, in the IP address will have to be set up as either Automatic or User defined. This depends on the settings of the existing network on which the recorder will be communicating. If the IP address needs to be fixed, the next step is to enter an IP address and a Subnet mask. The recorder is now ready for real time monitoring and data download to a PC without using the CF card.

Using the sample above, the recorder can also be set up using the CF card to transfer data rather that transferring data across a network. If using a CF card, the Observer I software package is needed along with a CF card reader installed on the same PC. To read the configuration and measured data from the CF card for the first time, it is necessary to press the **Save** key on the recorder to store the initial ECR1 configuration to the CF card. Once this is done, any measured data can then be transferred onto the CF card using the **Dump** key. Whenever the ECR1's configuration is changed, the new configuration must be saved to the CF card as the configuration is used by the Observer I software/ Observer I or II can also save measured data in Excel format when needed.

5 PC Software – Observer I & II

Observer I & Observer II are PC software packages to be used with the recorder. They are Windows 98, NT, 2000 and XP compatible to archive and analyze measured data, and configure the recorder from a PC. Their different applications are:

ECR1 without communication   Observer I   Basic software, supplied for free on recorders without communications

ECR1 with communication   Observer II   Extensive software, offered with recorders using communications such as Ethernet or RS-232/422/485

5.1 Hardware requirements

The use of a 200 MHz Pentium PC with 64 MB RAM minimum is recommended. The performance will be compromised if a slower PC is used, or with less memory.

5.2 Set up

To set up the software on a PC, insert the CD, double click the Setup program and follow the step by step instructions.

5.3 PC Software manual – HELP

After completing the Set up procedure, the user may get into HELP on the PC software and use it as the software manual.

5.4 Observer I – The basic software for non-communication application

Observer I is divided into two parts, Configuration and Historical Viewer.

Configuration: In non-communication applications, the user may receive configuration from the recorder via a CF card then change and send modified configuration back to the recorder via the CF card.

Historical Viewer: Receives and views historical data stored by the recorder. After saving configuration and measured data from the recorder to the CF card, insert the CF card into the CF reader connected to a PC. The PC will automatically receive configuration information from the CF card after a new Historical Viewer project is created. Click the icon to download historical measured data from the CF card so that the user may view the historical trend. To check for any unusual Historical Trends, use the tools to Zoom in, Zoom out and Scroll, or select Event/Alarm List to see the event and/or alarm value. Double click the alarm bar to view the trend at a specific time. Use the icon "Export data in Excel" to export measured data with true values in Excel format.

5.5 Observer II – The extensive software for communication application

Observer II is divided into three parts, Configuration, Real-time Viewer and Historical Viewer.

Configuration: In communication applications, the user may receive configuration from the recorder via Ethernet or RS-232/422/485, then change and send modified configuration back to the recorder.

Real-time Viewer: Receives and views real-time data measured by the recorder. When setting up a new project under the Real-time Viewer, click the icon "Configuration data", and do the configuration for real-time viewing on the PC.

When the recorder is communicating with a PC via Ethernet or RS-232/422/485, Observer II is able to monitor any real-time measured data "Received" from the recorder. The measured data can be displayed through digital, trend, bar and Event/Alarm format.

Historical Viewer: Receives and views historical data stored by the recorder. When setting up a new project under the Historical Viewer, click the icon "Receive configuration" to receive configuration information from the recorder. Then, confirm the configuration to receive historical measured data from the recorder in order to begin viewing the historical trend. To check for any unusual Historical Trends, use the tools Zoom in, Zoom out and Scroll, or select the Event/Alarm List to view any event and/or alarm values. Double click the alarm bar to view the trend at a specific time. Use the icon "Export data in Excel" to export measured data with true values in Excel format.

Note:
- Ethernet is the standard communications offered with this instrument. To enable Ethernet functionality, the extensive software Observer II package is required.

- To set up PC software Observer II, the IP address of the recorder must be keyed in. This IP address can be found in **Section 4.6 System Info** mode under Configuration.

- The configuration of the Real-time Viewer is set up through the PC. This is different from the configuration of Historical Viewer which requires the same setup as the recorder.

5.6 How to use PC software

After installing the basic PC software, Observer I, the user will find two parts Configuration and Historical Viewer. The extensive software Observer II is in three parts Configuration, Real-time Viewer, Historical Viewer.

Configuration: Enter Configuration, click the icon New ⬜ for a new project, key in the new project name, and then choose CF card or Ethernet.

a. If using a CF card, click the icon File 📂 , and select the file path of the CF card. A question appears - "Do you want to receive configuration data now?" Before confirming, the user needs to **Save** configuration and **Dump** measured data from the recorder to the CF card, then insert the card into a CF reader connected to a PC. After confirmation, the PC will receive configuration data from the CF card. In the configuration table, the user may review configuration by clicking the icons of Channel ✎ , Display 🔢 , Tools 🛠, Instrument 🖥 and System Information ˢʸˢ. This configuration is used by the Historical Viewer to read historical data and trends. If necessary, the user may alter the configuration on the PC and Send configuration changes ➪ to the CF card, then **Load** it to the recorder. Anytime the configuration of the recorder is altered, the PC can and must receive the configuration ➪ updates from the recorder via CF card.

b. For Ethernet, click the icon File 📂 , then key in the IP address of the recorder. A question appears - "Do you want to receive configuration data now?" After confirmation, the PC will receive configuration data from the recorder via Ethernet. In the configuration table, the user may review the configuration by clicking the icons of Channel ✎ , Display 🔢 , Tools 🛠, Instrument 🖥 and System Information ˢʸˢ. If necessary, the user may alter the configuration on the PC and Send configuration back ➪ to the recorder. This configuration is used by the Historical Viewer feature to read historical data and trends.

Historical Viewer: Enter the Historical Viewer and open the project file under Configuration as above.

Click the icon Import Measured Data ➪ to import measured data from the CF card or from the recorder via Ethernet. After the importing procedure, a trend will be displayed.

Click the icon 🖩 to show an Even/alarm list.

Click the icon Print 🖨 to print via PC.

Click the icon Page 1️⃣ to choose the Page number.

Click the icon Export ➪ to export data in Excel format.

Click the icon Copy 📋 to copy curves to a clipboard.

Click the icon Black **B** or White **W** to choose a black or white background.

Click the icon Horizontal ⬌ or Vertical ⬍ to display horizontal or vertical trends.

Click the icon Zoom Out 🔍 or Zoom In 🔍 to zoom out and zoom in on trends.

Click the icon Zoom Cancel 🔍 to display the trend from the beginning to the end on one full page.

Click the icon Seek by time 🕐 to display the trend at a specific time.

Click the icon Seek by Event/Alarm to search for a specific event or alarm.

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Real-time Viewer: Enter into Real-time Viewer segment.

Click the New [icon] icon for a new project, enter the new project name, then key in the IP address of the recorder. If more than one recorder is being used, key in their IP addresses and press + button to put them all in the IP list. The PC will automatically receive new configuration settings from the recorder. For real-time monitoring, the user could use the original configuration and make no changes. If necessary, the user may change the following configurations: Tag name, Log speed, Log method, Unit and Alarm in active color. Options in inactive colors may not be changed. The real-time data is displayed in the following four formats: digital, bar, trend and alarm list.

Click the icon [icon] to display the measured data collected and stored by the Real-time Viewer in Trend mode. Click [icon] to display the Real-time Viewer in Cascade mode.
Click the icon [icon] to mute, which silences the alarm. Click again to restore alarm sound.

The configuration of the Real-time Viewer may or may not be consistent with the configuration of Historical Viewer.

6 Mathematics

With the Math option, the following Math functions are available in the Channel mode of configuration. The equations can be used to produce mathematical solutions by using measured data or computed data as variables. The results can be displayed and stored. The Math expression / equation can be keyed in up to a maximum of 36 characters.

6.1 Math Expressions and an example

Expressions on recorder	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)
TG(x)	tan(x)
CTG(x)	1/tan(x)
ASIN(x)	Sin^{-1}(x)
ACOS(x)	Cos^{-1}(x)
ATG(x)	Tan^{-1}(x)
LOG(x)	log$_{10}$(x)
ABS(x)	Absolute of x
SQ(x)	x^2
ROUND(x)	The closest integral number to x
HI(x,y)	The bigger value between x and y
LO(x,y)	The smaller value between x and y
INV(x)	1/x
PCT(x,Hi,Lo)	PCT % = x / Hi-Lo, x: Target Value, Hi: High Value, Lo: Low Value
x%y	Remainder of x/y
x^y	x^y

An example of Math

Set up a Math channel after setting up three analog inputs. In **Channel** mode, press the Math key to get into a Math channel. Assign the Name, Description, Enable Type, define Log Speed, Log Method, and do Math Expression / Equation. Then, select **Display** mode. Configure mode, Trend Direction and Background color. If Pens 1, 2 and 3 have been used for three analog inputs, then select Pen 4 to be used for Math. Press the **Enter** key under the **Channel** column of Pen 4, then select MATH1. Define Color, Width of the trend, DisplayHi and DisplayLo. Press the **Back** key twice to return to the beginning of the display and all configurations will be memorized. The Math function has now been initialized.

7 Specifications

7.1 General Specifications

Power
90-250VAC, 47-63Hz, 60VA, 30W maximum
11-18VDC or 18-36 VDC, 60VA, 30W maximum

Display
6.1 TFT LCD, 640X480 pixel resolution, 256 colors

Memory
8MB storage memory on board
Storage media: 16, 64, 128 MB CF (Compact Flash) cards

Analog Input Card (AI181, AI182, AI183)

Channels:	AI181 ~ 1 channel, AI182 ~ 2 channels, AI183 ~ 3 channels
Resolution:	18 bits
Sampling Rate:	5 times/ second
Maximum Rating:	-2 VDC minimum, 12 VDC maximum (1 minute for mA input)
Temperature Effect:	±1.5 μV/°C for all inputs except mA ±3.0 μV/°C for mA input

Sensor Lead Resistance Effect:
  T/C: 0.2 μV/ohm
  3-wire RTD:
  2-wire RTD:
	
	2.6°C /ohm of resistance difference of two leads
	2.6°C /ohm of resistance sum of two leads

Burn-out Current:	200nA
Common Mode Rejection Ratio (CMRR):	120dB
Normal Mode Rejection Ratio (NMRR):	55dB
Isolation Breakdown Voltage between channels:	430VAC 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 10 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	2.2MΩ
K	-200 ~ 1370°C (-328 ~ 2498°F)	±1°C	2.2MΩ
T	-250 ~ 400°C (-418 ~ 752°F)	±1°C	2.2MΩ
E	-100 ~ 900°C (-148 ~ 1652°F)	±1°C	2.2MΩ
B	0 ~ 1820°C (32 ~ 3308°F)	±2°C (200 ~ 1820 °C)	2.2MΩ
R	0 ~ 1768°C (32 ~ 3214°F)	±2°C	2.2MΩ
S	0 ~ 1768°C (32 ~ 3214°F)	±2°C	2.2MΩ
N	-250 ~ 1300°C (-418 ~ 2372°F)	±1°C	2.2MΩ
L	-200 ~ 900°C (-328 ~ 1652°F)	±1°C	2.2MΩ
PT100 (DIN)	-210 ~ 700°C (-346 ~ 1292°F)	±0.4°C	1.3KΩ
PT100 (JIS)	-200 ~ 600°C (-328 ~ 1112°F)	±0.4°C	1.3KΩ
mV	-8 ~ 70mV	±0.05%	2.2MΩ
mA	-3 ~ 27mA	±0.05%	70.5Ω
0~1V	-0.12 ~ 1.15V	±0.05%	332KΩ
0~5V	-1.3 ~ 11.5V	±0.05%	332KΩ
1~5V	-1.3 ~ 11.5V	±0.05%	332KΩ
0~10V	-1.3 ~ 11.5V	±0.05%	332KΩ

Digital Input Card (DI181)
Channels: 6 per card
Logic Low: -30V minimum, 0.8V maximum
Logic High: 2V minimum, 30V maximum
External pull-down Resistance: 1KΩ maximum
External pull-up Resistance: 1.5MΩ minimum

Digital Output Card (DO181)
Channels: 6 per card
Contact Form: N.O. (form A)
Relay Rating: 5A/240 VAC, life cycles 200,000 for resistive load

24VDC Auxiliary Power Supply Card (AP181)
Channels: to be used for 6 transmitters
Output Rating: 24 ± 1 VDC, 180mA in maximum, 30mA / each channel

COMM Module (CM181)
Interface: RS-232 (1 unit), RS-485 or RS-422 (up to 247 units)
Protocol: Modbus Protocol RTU mode
Address: 1-247
Baud Rate: 0.3~38.4 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 Base T
Ports: AUI (Attachment Unit Interface) and RJ-45, Auto- detect capability

Infrared Detector
Distance: Detect moving human body in distance around 2 meters
Time delayed: 10, 20, 30, 40, 50 or 60 minutes to be defined

Environmental & Physical

Operating Temperature:	5 ~ 50℃
Storage Temperature:	-25 ~ 60℃
Humidity:	20 to 80% RH (non-condensing), maximum relative humidity 80% for temperature up to 31℃ decreasing linearly to 50% relative humidity at 40℃
Altitude:	2000 M maximum
Insulation Resistance:	20 M ohms min. (at 500 VDC)
Dielectric Strength:	3000 VAC, 50/60 Hz for 1 minute
Vibration Resistance:	10-55 Hz, 10m/ s_ for 2 hours
Shock Resistance:	30m/ s_ (3g) for operation, 100g for transportation
Operation Position:	no inclined restriction
Dimensions:	
Panel Mount style:	166(W) x 144(H) x 174mm(D)
Bench Top style:	166 (W) x 192 (H) x 194mm (D)
Standard Panel Cutout:	DIN size in 138 x 138mm

Approval Standards

Safety:	UL61010C-1, CSA C22.2 No. 1010.1-92 EN61010-1 (IEC1010-1) over voltage category II, Pollution degree 2
Protective Class:	IP 30 front panel for indoor use, IP 20 housing and terminals
EMC:	
Emission:	EN50081-1, EN61326 (EN55011 class B, EN61000-3-2, EN61000-3-3)
Immunity:	EN50082-2, EN61326 (EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-11, EN50204)

7.2 Communication

The standard communication interface is Ethernet with protocol IEEE 802.3 - 10 Base T. Other options are RS-232 / RS-422 / RS-485.

7.3 Data Security

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

Chromalox®
PRECISION HEAT AND CONTROL

Chromalox, Inc.
103 Gamma Drive
Pittsburgh, PA 15238
Phone: 1-888-996-9258
www.chromalox.com