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# CO<sub>2</sub> / Temp / RH Indoor Air Quality Meter

Users Manual V.1.0

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# 1. FEATURES & SPECIFICATIONS

## Features

- 3 Independent CO<sub>2</sub>, humidity and temperature sensors.
- User operated CO<sub>2</sub> calibration.
- Datalogging : 50,000 records.
- Fast USB download (50,000 records in less than 10 seconds).
- Internal backup battery to maintain date / time setting.
- Power management IC to increase batter efficiency.
- Easy- to-Use PC software for parameter settings and data analysis.
- Internal CO<sub>2</sub> alarm buzzer.

## Specifications

- CO<sub>2</sub> Sensing Method : NDIR (Non-Dispersive Infrared)
- Measures : Carbon dioxide in PPM, temperature (°F or °C), % Relative Humidity
- CO<sub>2</sub> Measurement range : 0~9999 ppm (2001~9999 ppm over range)
- CO<sub>2</sub> Accuracy : ± 75ppm, ± 8% of reading (0~2000 ppm)
- Display Resolution : ±1 ppm
- Datalogging : 50,000 records.

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## Applications

- Building HVAC monitoring.
- Indoor air quality survey.
- Locate the presence of combustion fumes from vehicles and appliances.

## General

Operation Condition	32-122 °F (0-50 °C)
	0-95%,RH,non-condensing
Storage Temperature	-4 to 140 °F (-20 to 60 °C)

## CO<sub>2</sub> Sensor

Type	Non-dispersive infra-red (NDIR)
Measurement Range	0~9999 ppm (2001~9999 ppm over range)
Accuracy	± 75ppm, ± 8% of reading (0~2000 ppm)
Resolution	±1 ppm
Response Time	Reaches 90% in approximately 2 minutes

## Relative Humidity Sensor

Type	CMOSens
Measurement Range	1%-99%
Accuracy	±3.0%RH(20~80%) at 25°C ±5.0%RH(<20%,>80%) at 25°C
Resolution	0.1%
Response Time	8 Seconds

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## Temperature Sensor

Type	Thermistor
Measurement Range	0 to 50 °C
Accuracy	±1.0 °C from 0-50 °C
Resolution	0.1 °C
Response Time	1 seconds

## Power Supply

Battery	4 AA alkaline battery
Battery Operation	24 hours
External Power Supply	6V VDC with 0.5A

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## 2. WHAT'S IN THE BOX



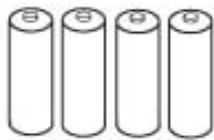
1. Main Unit



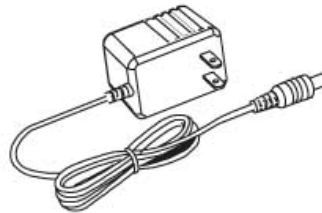
2. USB Cable



3. Installation Disk



4. 4X1.5V AA  
Alkaline Battery




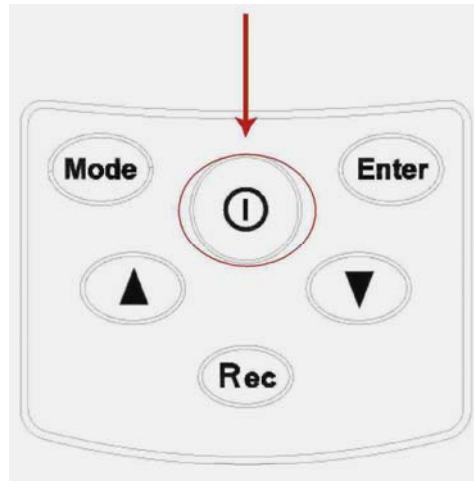
5. 6V DC Adaptor

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### 3. START UP AND GENERAL OPERATION

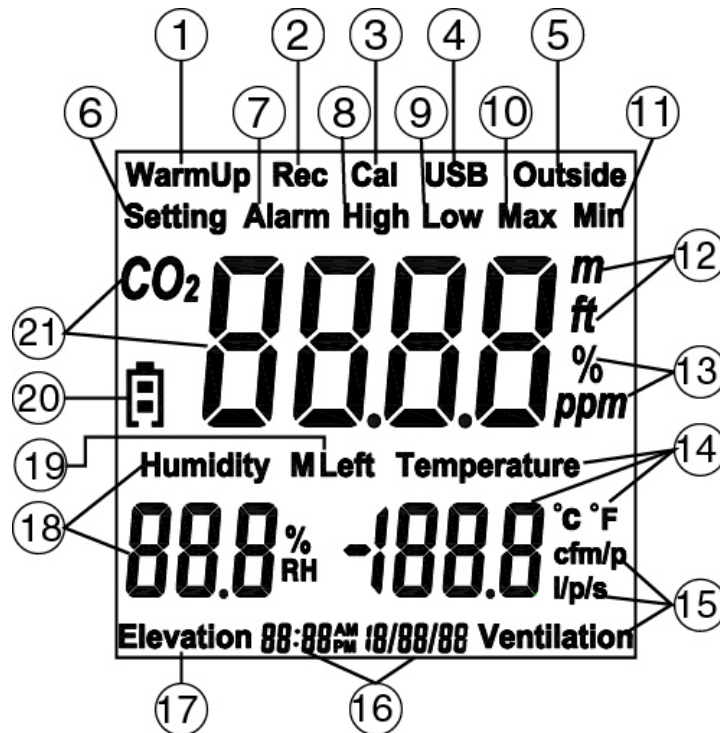
#### Start Up

- Hold the  Power button for 2 seconds to turn on Meter.



- Wait few seconds until the “Warm-up” sign turns off.
- The unit is ready to use.

## LCD Display




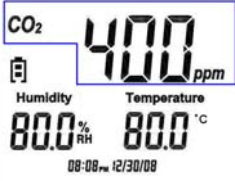


1.	Warm Up	12.	Meter / Foot
2.	Recording	13.	% PPM
3.	Calibration	14.	Temperature Reading
4.	USB	15.	Flow Rate
5.	Outside- CO2	16.	Time & Date
6.	Setting	17.	Elevation
7.	Alarm	18.	Humidity
8.	High	19.	Memory Left
9.	Low	20.	Battery
10.	Maximum	21.	CO2 Reading
11,	Minimum		




1.		Mode	4.		Down Arrow
2.		Enter	5.		Up Arrow
3.		Power	6.		Record



## Meter Buttons





## Display Screen (1-7)

1.	2.	3.	4.
			
Main Screen Temp.(F)	Main Screen Temp.(C)	% of Memory Left	Maximum Reading: CO <sub>2</sub> / Rh / Temp


5.	6.	7.
		
Minimum Reading: CO <sub>2</sub> Humidity & Temperature	CFM / P ventilation (Cubic Foot Per Minute Per Person)	l / p / s Ventilation (Liter Per Second)

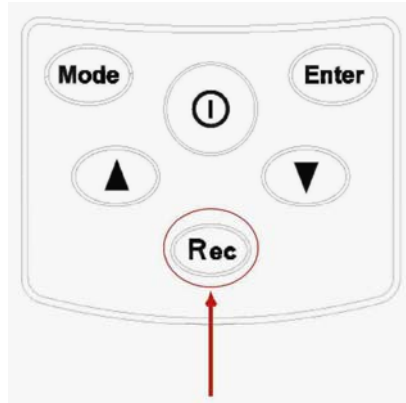
- Press  to rotate the screen in the clockwise direction.=2
- Press  to rote the screen in the counter-clockwise direction.

## Clear Memory

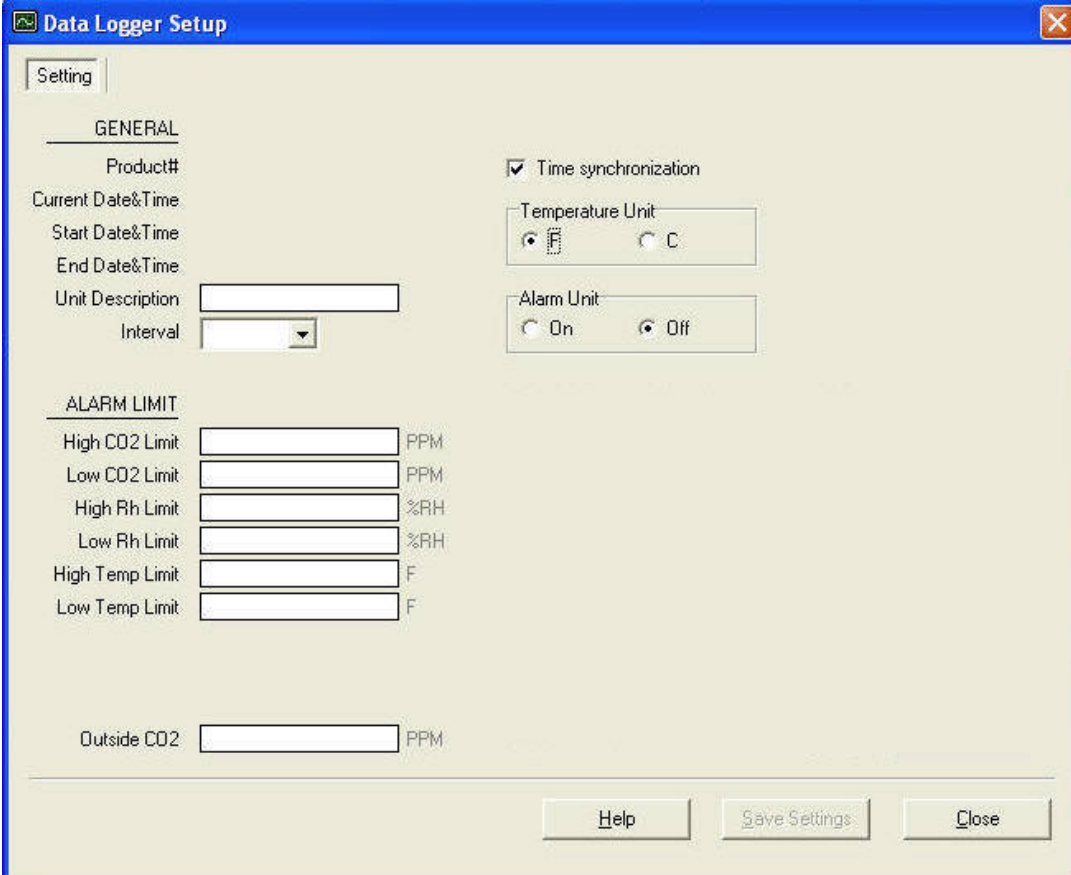
- Press  &  together to clear the datalogging memory and restore the memory capacity back to 100%.

## Recording and Datalogging

Hold  for 2 seconds to start data recording.




Sampling rate (5sec / 10sec / 1min / 5min / 10min / 30min / 1 hour / 2 hour) can only be set from PC setup screen.

A screenshot of the 'Data Logger Setup' software window. The window has a blue title bar and a 'Setting' tab. The main area is divided into sections: 'GENERAL' with fields for Product#, Current Date&Time, Start Date&Time, End Date&Time, Unit Description, and Interval; 'ALARM LIMIT' with fields for High CO2 Limit, Low CO2 Limit, High Rh Limit, Low Rh Limit, High Temp Limit, and Low Temp Limit; and 'Outside CO2'. On the right side, there are checkboxes for 'Time synchronization', radio buttons for 'Temperature Unit' (F and C), and radio buttons for 'Alarm Unit' (On and Off). At the bottom, there are 'Help', 'Save Settings', and 'Close' buttons.

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## Datalogging Power Saving Mode

Sampling rate longer than 5 minutes (5min / 10min / 30min / 1 hour) will automatically turn on power-saving mode. The Meter will be in power-saving mode during the non-sampling period. One minute before the sampling time, the Meter will turn on to take the sample. After the sampling is done, the Meter will turn back to power-saving mode. While in the power-saving mode, the Meter will not respond to any key inputs.

Hold  for 2 seconds to exit the datalogging mode.

<b>Sampling Interval</b>	<b>Power-Saving</b>
5 seconds	
10 seconds	
1 minutes	
5 minutes	✓
10 minutes	✓
30 minutes	✓
1 hour	✓
2 hour	✓

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## CFM / P (Cubic Foot Per Minute per Person) Calculation Example

$$\text{CFM/P} = 10600 / (\text{Cs} - \text{Co})$$

- Cs=CO<sub>2</sub> reading
- Co=CO<sub>2</sub> outside reading

Example:

10,600 Constant

650 Cs=CO<sub>2</sub> reading

400 Co=CO<sub>2</sub> outside reading

42.4 CFM / P

$$10,600 / (650 - 400) = 42.4 \text{ (CFM / P)}$$

## L / P / S (Liter Per Second)


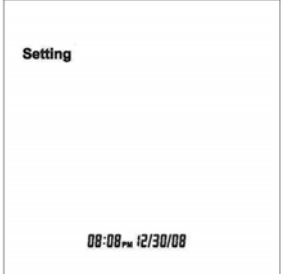


$$\text{L / P / S} = (\text{CFM/P}) \times 28.32 / 60$$

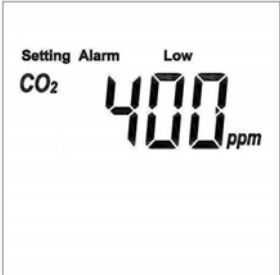
Example:

48.60	=CFM / P (Cubic Foot Per Minute / person)
28.32	=1 Cubic Foot = 28.3168466 Liters
60.00	=Divided by 60 to get per second reading
22.9	=L / P / S (Liter Per Second)

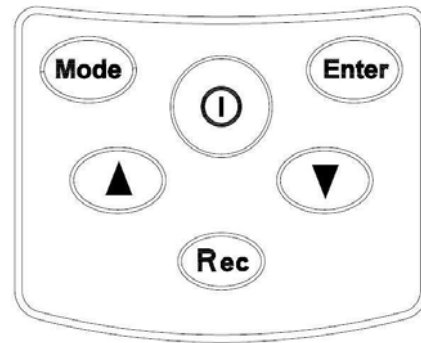
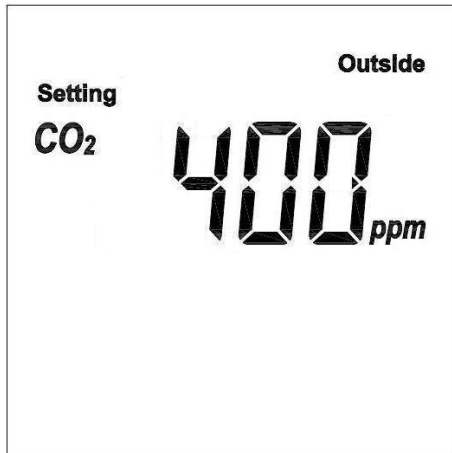
$$48.6 \times 28.32 / 60 = 22.9 \text{ (L / P / S)}$$

Parameter Setup Screen (1-5)

1.	2.	3.	4.
			
<p>Setting Outside CO<sub>2</sub> Value</p>	<p>Clock Setting</p>	<p>Alarm Buzzer Setting</p>	<p>High CO<sub>2</sub> Alarm Setting</p>

5.

<p>Low CO<sub>2</sub> Alarm Setting</p>

1. Enter Outside CO2 Value (default setting is 400ppm)

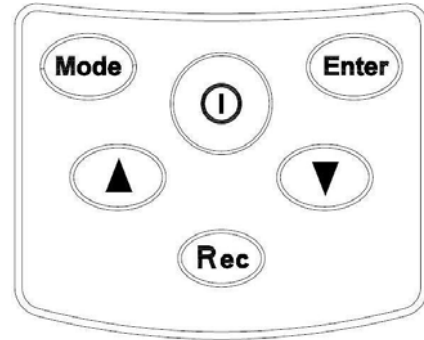
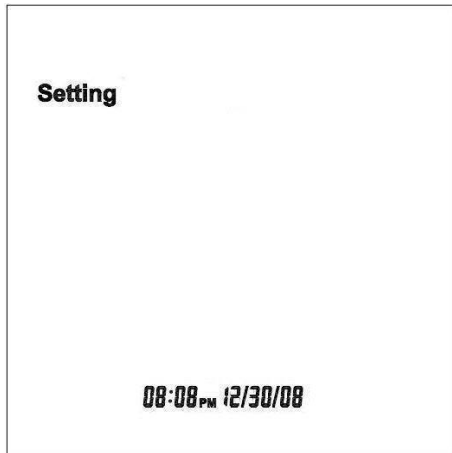


Enter Outside CO<sub>2</sub> Manually:

- Press + to enter the setting menu.
- Press 5 times.
- Press to enter the Outside CO<sub>2</sub> setting Menu (First digit starts to flash).
- Press to rotate between digits.
- Press to save.
- Press and to return to the Main menu.

Unit	Enter Value
1st digit	Use  and  Select (0-9)
2nd digit	Use  and  Select (0-9)
3rd digit	Use  and  Select (0-9)
4th digit	Use  and  Select (0-9)

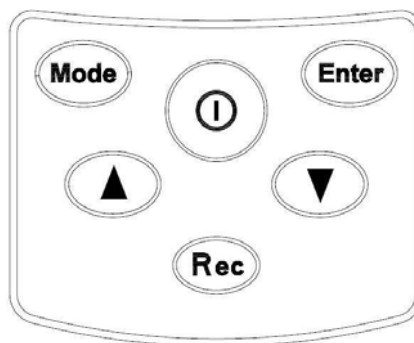
## 2. Clock Setting












- Press **Mode** and **Enter** to enter the setting menu.
- Press **▼** 1 x time to reach the Clock-Setting screen.
- Press **Enter** to enter Clock-Setting mode.
- Press **Mode** to rotate between digits.
- Press **Enter** to save and exit the Time Setting menu.
- Press **Mode** and **Enter** to return to the Main menu.

Unit	Enter Value (0-9)	Range
Hour	Use <b>▲</b> and <b>▼</b>	(0AM -11PM)
Minute	Use <b>▲</b> and <b>▼</b>	(0-59)
Month	Use <b>▲</b> and <b>▼</b>	(1-12)
Date	Use <b>▲</b> and <b>▼</b>	(1 to 31)
Year	Use <b>▲</b> and <b>▼</b>	(2001-2037)

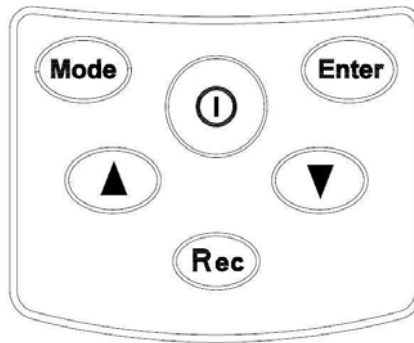
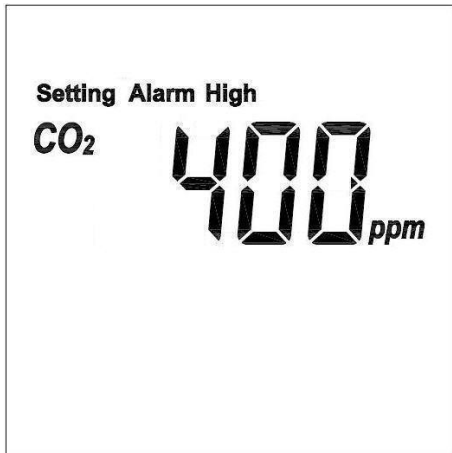
### 3. Audible Alarm Setting



- Press  and  to enter the setting menu.
- Press  2 times.
- Press  to enter the Audible Alarm Setting Page. Current audible alarm status (On / Off) will start to flash.
- Use  and  keys to switch between On / Off.
- Press  to save and exit.
- Press  and  to return to the Main menu.



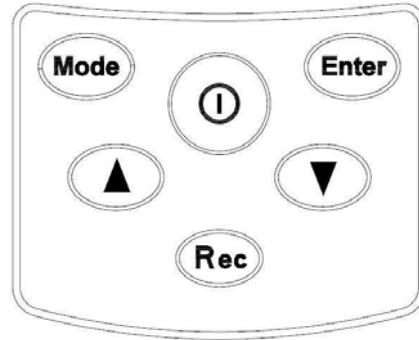
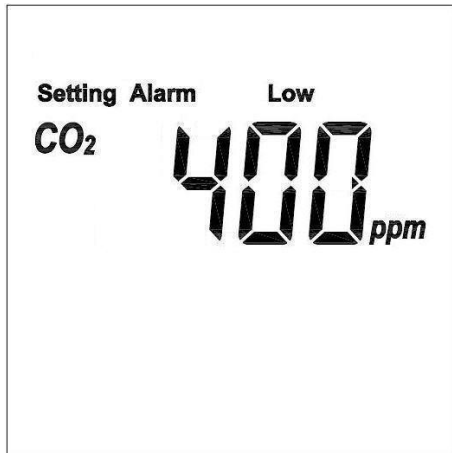
#### 4. CO2 High Alarm Setting



- Press **Mode** and **Enter** to enter the setting menu.
- Press **▼** 3 times.
- Press **Enter** to enter the High Alarm Setting Menu (First digit starts to flash).
- Press **Mode** to rotate between digits.
- Press **Enter** to save and exit the High Alarm Setting menu.
- Press **Mode** and **Enter** to return to the Main menu.

Unit	Select Digit	Enter Value
1st digit	<b>Mode</b>	Use <b>▲</b> and <b>▼</b> Select (0-9)
2nd digit	<b>Mode</b>	Use <b>▲</b> and <b>▼</b> Select (0-9)
3rd digit	<b>Mode</b>	Use <b>▲</b> and <b>▼</b> Select (0-9)
4th digit	<b>Mode</b>	Use <b>▲</b> and <b>▼</b> Select (0-9)

## 5. CO<sub>2</sub> Low Alarm Setting








- Press **Mode** + **Enter** to enter the setting menu.
- Press **▼** 4 times.
- Press **Enter** to enter the Low Alarm Setting Menu (First digit starts to flash).
- Press **Mode** to rotate between digits.
- Press **Enter** to save and exit the Low Alarm Setting menu.
- Press **Mode** and **Enter** to return to the Main menu.

Unit	Enter Value
1st digit	Use <b>▲</b> and <b>▼</b> Select (0-9)
2nd digit	Use <b>▲</b> and <b>▼</b> Select (0-9)
3rd digit	Use <b>▲</b> and <b>▼</b> Select (0-9)
4th digit	Use <b>▲</b> and <b>▼</b> Select (0-9)

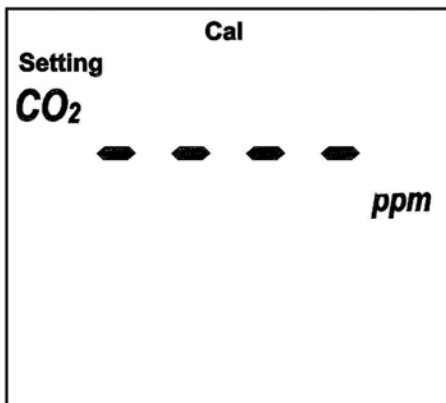
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## 0ppm and 400ppm CO<sub>2</sub> Calibration

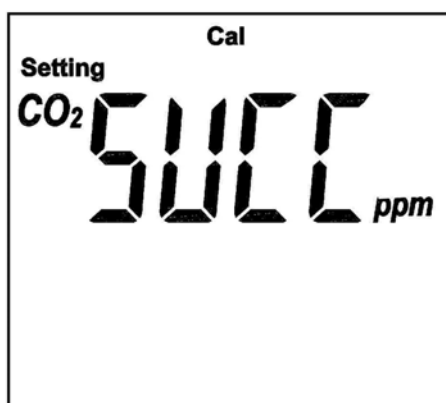
- Press  +  together to enter CO<sub>2</sub> Calibration menu.
- Press  or  to switch between 0 or 400ppm calibration.
- Press  to start calibration.

While calibrating, the LCD will show :

Do not press any button during the calibration.

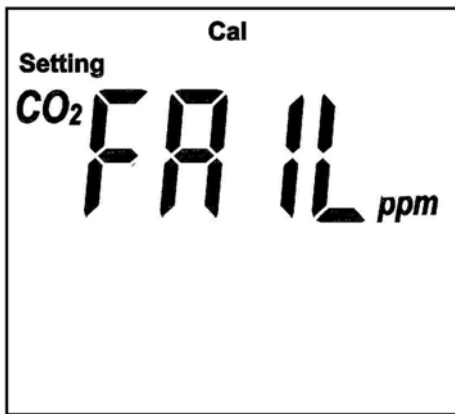


If the calibration is successful, the LCD will show :



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If the calibration failed, the LCD will show:



- Press power to power off and restart again.

Now the Meter is working with new calibrated value.

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## 4. PC SOFTWARE & DRIVER INSTALLATION

Installation Requirements:

Minimum system requirements for the software:

-Pentium III - 500 MHz processor or equivalent with 128 megabytes of RAM.

Optimal Performance:

-Pentium 4 - 2.8 gigahertz processor or equivalent with 256 megabytes or RAM.

Operating System Requirements:

-Windows 2000

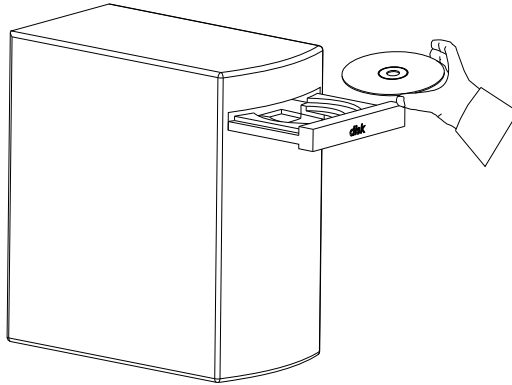
-Windows XP

-Window 7

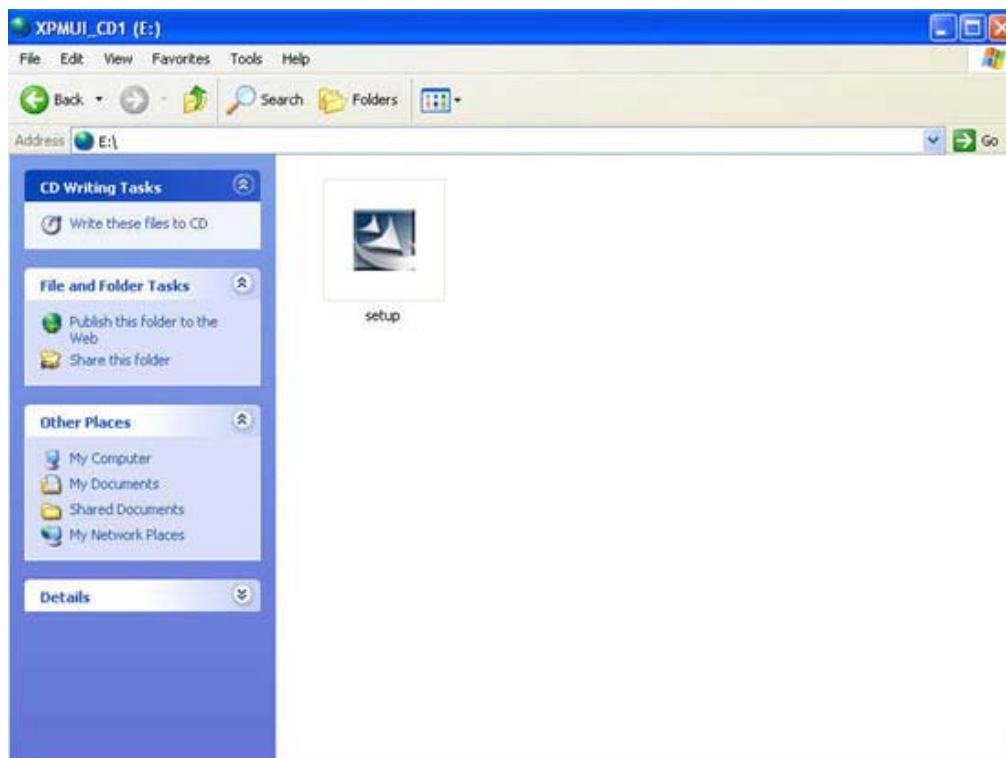
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## PC DRIVER INSTALLATION

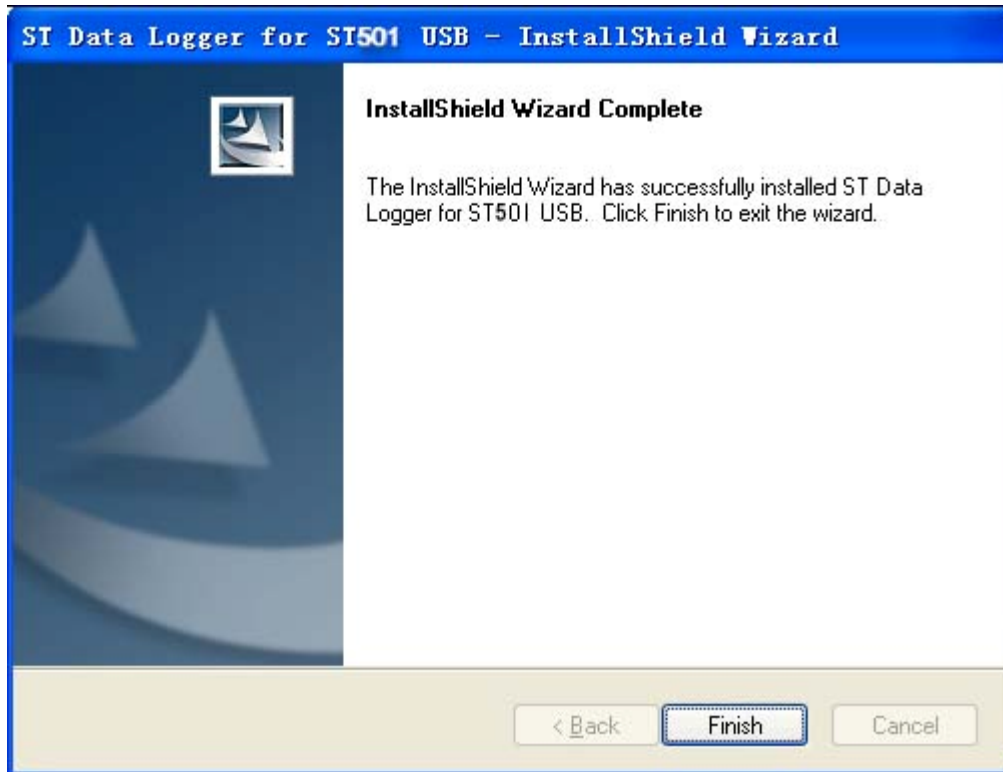
- Insert the CD into the disk drive.



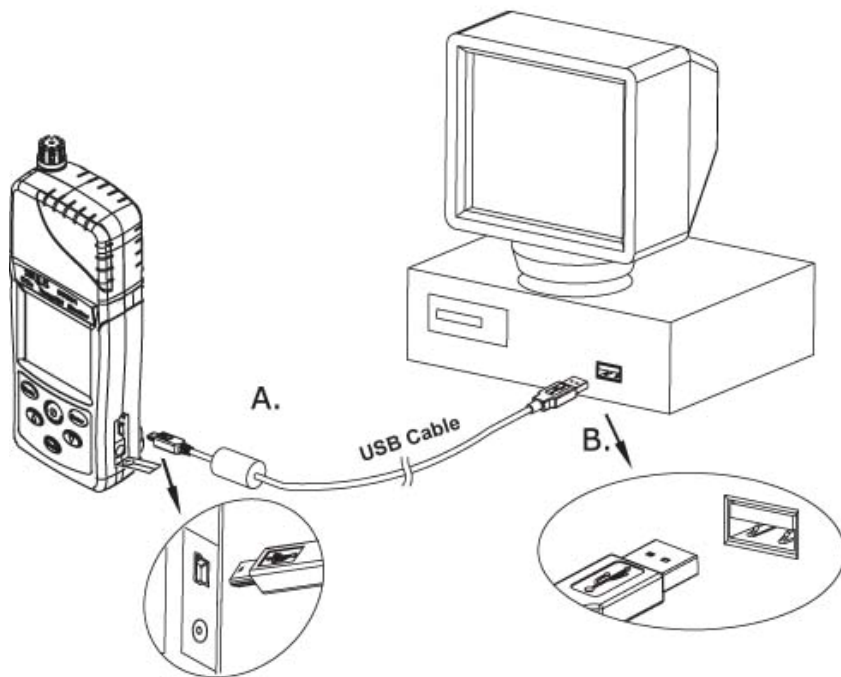
- Click Setup to start installation.



- 
- Follow the steps on the Installation Shield Wizard and click Finish to complete the installation.



- 
- Connect Meter and PC together with a USB cable.





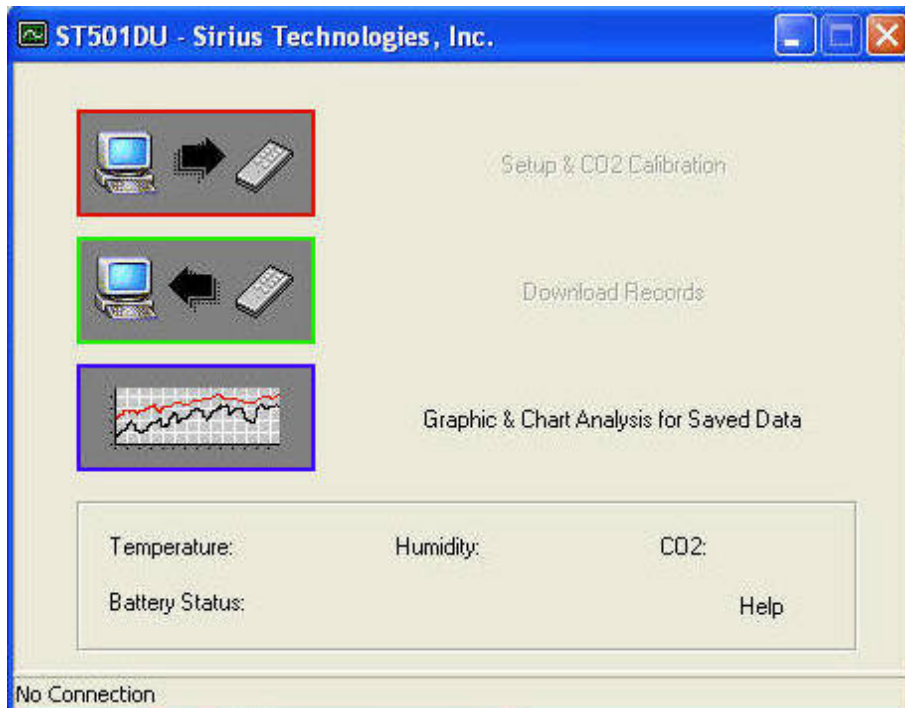
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## 5. USING PC SOFTWARE

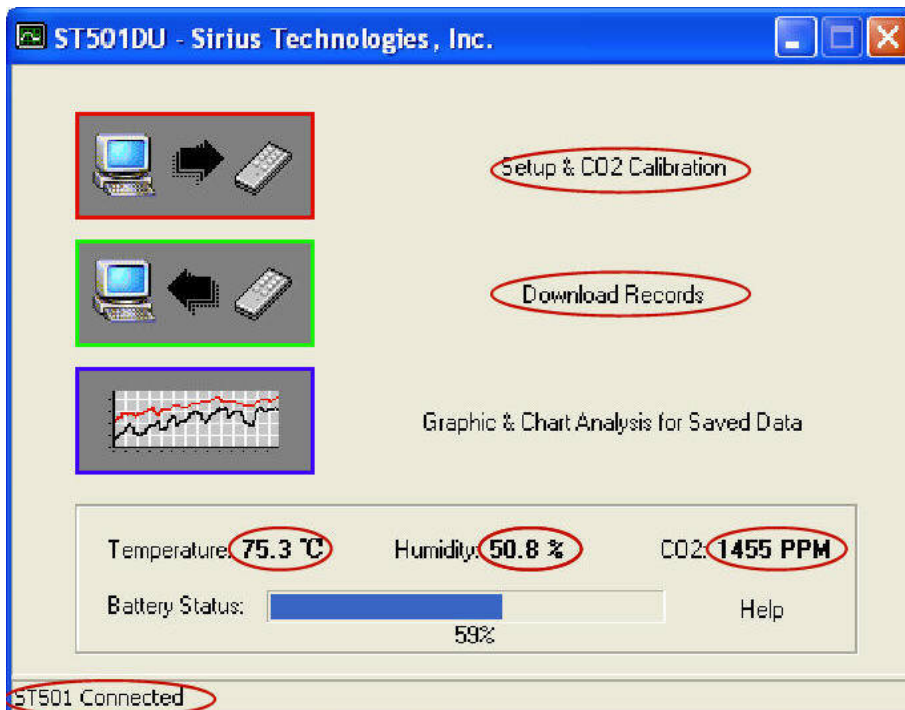
- Start Window XP software.
- Click on All programs, Click on Meter.
- Click on ST Logger to start the PC program.



## Connection Status



No Connection Screen



Connected Screen

## Setup Screen

The screenshot shows the 'Data Logger Setup' window with the 'CO2 Calibration' tab selected. The window is divided into several sections:

- GENERAL**:
  - Product#: ST501DU - USB
  - Current Date&Time: 11/17/2007 10:59:57 (circled in red)
  - Start Date&Time: 07/25/2007 23:28:21
  - End Date&Time: 07/26/2007 05:01:41
  - Unit Description: ST501DU
  - Interval: 5sec
  - Time synchronization:
  - Temperature Unit:  F  C
  - Ventilation Unit:  LPS  CFM/P
- ALARM LIMIT**:
  - High CO2 Limit: 100 PPM (circled in red)
  - Low CO2 Limit: 20 PPM
  - High Rh Limit: 90 %RH
  - Low Rh Limit: 20 %RH
  - High Temp Limit: 70 C
  - Low Temp Limit: 20 C
- Elevation Unit**:  Feet(ft)  Meter(m)

At the bottom, there are three buttons: 'Help', 'Save Settings' (circled in red), and 'Close'.

- The values in the white area can be changed by the user.

High CO2 Limit  PPM

- The value in the inverted area can not be changed by the user.

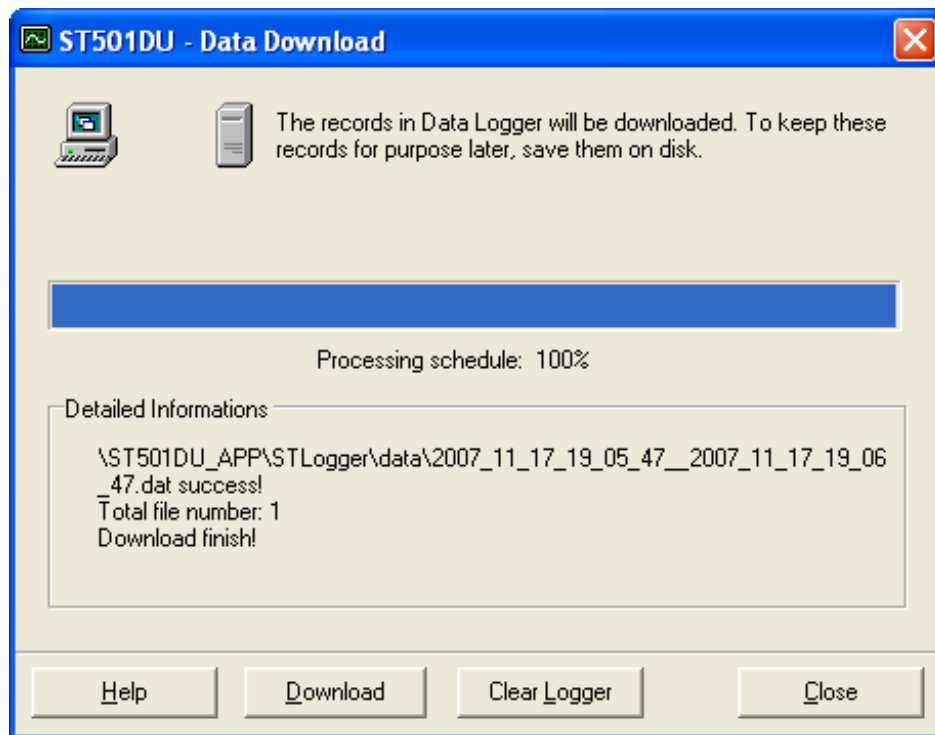
Product# ST501DU - USB

- Click Save Settings to save the values to Meter.

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## Download Records

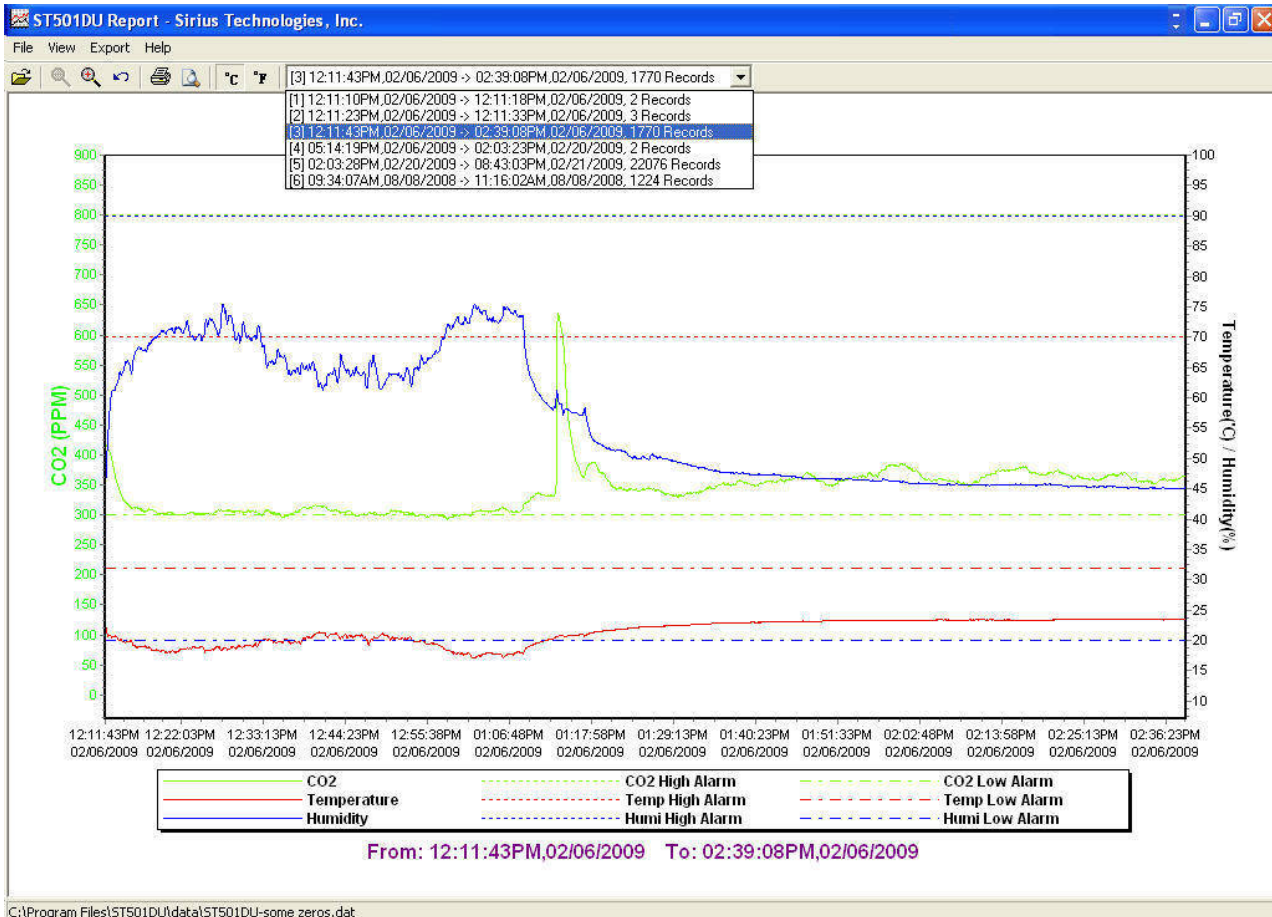
- Click Download to download the stored data.



Download completed screen

## Graphic & Chart Analysis

- Downloaded data will first be displayed in graphic format.



- Each data groups are listed according to the date of acquisition. Lowest group number represents earliest acquisition date.

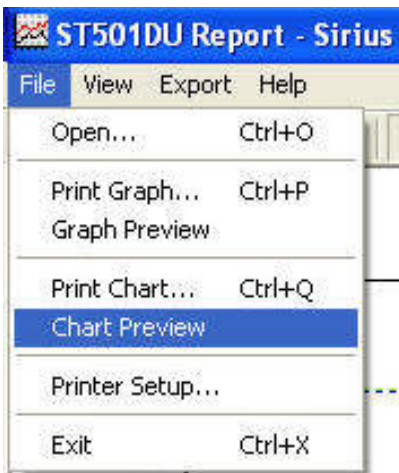


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## Data in Text Format

To display data in Listing format:

- Click File
- Click Chart Preview



## Text Listing Format

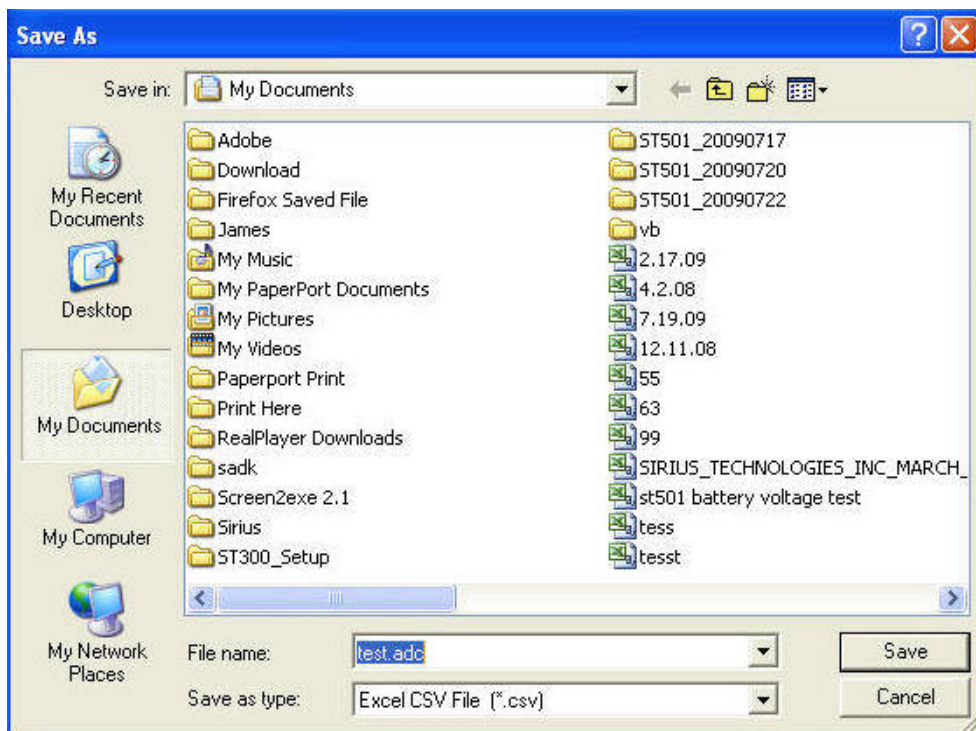
Product Name: ST501DU  
 Description: STLogger Record Data  
 Start Date&Time: 12:11:43PM,02/06/2009  
 End Date&Time: 02:39:08PM,02/06/2009  
 Interval: 5 seconds  
 Record Count: 1770  
 CO2 Alarm High: 800 PPM  
 CO2 Alarm Low: 300 PPM  
 Temp Alarm High: 70.0 °C  
 Temp Alarm Low: 32.0 °C  
 Humi Alarm High: 90 %  
 Humi Alarm Low: 20 %

<u>No.</u>	<u>Date</u>	<u>Time</u>	<u>Temp(°C)</u>	<u>Alarm</u>	<u>Humi(%)</u>	<u>Alarm</u>	<u>CO2(PPM)</u>	<u>Alarm</u>
1	12:11:43PM	02/06/2009	22.7	Low	45.6		412	
2	12:11:48PM	02/06/2009	22.5	Low	45.9		415	
3	12:11:53PM	02/06/2009	22.1	Low	47.6		416	
4	12:11:58PM	02/06/2009	21.5	Low	50.0		417	
5	12:12:03PM	02/06/2009	20.8	Low	52.5		411	
6	12:12:08PM	02/06/2009	20.6	Low	54.3		410	
7	12:12:13PM	02/06/2009	20.8	Low	55.4		409	
8	12:12:18PM	02/06/2009	20.8	Low	57.3		406	
9	12:12:23PM	02/06/2009	20.7	Low	58.4		404	
10	12:12:28PM	02/06/2009	20.9	Low	59.8		401	
11	12:12:33PM	02/06/2009	20.6	Low	60.4		396	
12	12:12:38PM	02/06/2009	20.5	Low	60.9		393	
13	12:12:43PM	02/06/2009	20.6	Low	61.2		388	
14	12:12:48PM	02/06/2009	20.6	Low	61.2		384	
15	12:12:53PM	02/06/2009	20.6	Low	61.2		378	
16	12:12:58PM	02/06/2009	20.7	Low	61.2		372	
17	12:13:03PM	02/06/2009	20.8	Low	61.3		367	
18	12:13:08PM	02/06/2009	20.5	Low	61.7		363	
19	12:13:13PM	02/06/2009	20.5	Low	62.2		358	
20	12:13:18PM	02/06/2009	20.6	Low	62.4		355	
21	12:13:23PM	02/06/2009	20.3	Low	62.4		352	
22	12:13:28PM	02/06/2009	20.3	Low	62.5		350	
23	12:13:33PM	02/06/2009	20.0	Low	63.2		346	
24	12:13:38PM	02/06/2009	19.9	Low	64.0		344	
25	12:13:43PM	02/06/2009	20.0	Low	64.3		339	
26	12:13:48PM	02/06/2009	20.1	Low	64.1		337	
27	12:13:53PM	02/06/2009	20.2	Low	63.7		334	
28	12:13:58PM	02/06/2009	20.0	Low	63.8		333	
29	12:14:03PM	02/06/2009	19.9	Low	64.1		329	
30	12:14:08PM	02/06/2009	19.8	Low	64.4		326	
31	12:14:13PM	02/06/2009	19.8	Low	64.5		325	
32	12:14:18PM	02/06/2009	19.7	Low	64.8		324	
33	12:14:23PM	02/06/2009	19.6	Low	65.6		323	
34	12:14:28PM	02/06/2009	19.6	Low	65.9		322	
35	12:14:33PM	02/06/2009	19.8	Low	65.7		321	
36	12:14:38PM	02/06/2009	19.8	Low	66.0		319	
37	12:14:43PM	02/06/2009	19.8	Low	66.1		318	
38	12:14:48PM	02/06/2009	19.9	Low	66.0		316	
39	12:14:53PM	02/06/2009	19.9	Low	65.8		316	
40	12:14:58PM	02/06/2009	19.8	Low	65.6		315	
41	12:15:03PM	02/06/2009	19.8	Low	65.3		314	
42	12:15:08PM	02/06/2009	19.9	Low	64.8		313	

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## Data Export

Select export data type: Text or Excel CSV



Click Save to save the file in .CSV/Txt format.



File Saved.



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## 6. WARRANTY

Meter is warranted for a period of twelve (12) months from the date of purchase to be free of defects in material or workmanship. This warranty does not apply to damage resulting from accident, alteration, abuse, loss of parts or repair by other than Sirius Technologies, Inc. The equipment will be repaired or replaced, at our option, without charge to the owner for parts or labor incurred in such repair. This warranty shall not apply unless the equipment is returned for our examination with all transportation charges prepaid.