



**TOKYO DEVICES**

# IWS730-USB/IWS731-USB

“Air Analyzer” USB Carbon Dioxide (CO<sub>2</sub>), Temperature, and Humidity Sensor

Revision 1.0



The Tokyo Devices IWS730/IWS731 "Air Analyzer" is a USB-connected carbon dioxide meter. By connecting it to a computer, you can regularly monitor the air quality. The control commands provided free of charge enable recording to CSV files and integration into custom applications. It is versatile and can be used for indoor environment monitoring, healthcare, plant factories, greenhouse agriculture, security, and surveillance systems.

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## 1. Specifications

項目		値	単位	備考
<b>Power Supply</b>		5 (± 10%)	V	Bus-powered
<b>Power Consumption</b>		Avg. 50 Peak 200	mA	
<b>Temp. Range</b>		-10 - 60	°C	
<b>Humid. Range</b>		0 – 95	%RH	No condensation
<b>USB Comm.</b>		USB 1.1		HID Device
<b>USB Connector</b>		Mini B		
<b>Dimensions</b>		90.4 x 50.4 x 29.5	mm	With fixing flange
<b>Software</b>	OS	Windows 7 or Later Linux		
	Sampling Duration	10	Sec.	Fixed
<b>LED Indicator</b>		3mm Red LED		can be turned on and off from the software
<b>CO<sub>2</sub> Sensor</b>	Range	0 – 5000 (IWS731) 0 – 2000 (IWS730)	ppm	Accuracy will be affected if exposed to less than 400ppm for more than 15 minutes.
	Accuracy	± 3%	ppm	Designed Value, Not Tested.
	Time Constant	180	Sec.	
<b>Temp. Sensor</b>	Accuracy	± 5% typ.	°C	Designed Value, Not Tested.
	Resolution	0.01	°C	
	Time Constant	1,200	Sec.	
<b>Humid. Sensor</b>	Accuracy	± 10.0 typ.	%RH	Designed Value, Not Tested.
	Resolution	0.05	%RH	
	Time Constant	8	Sec.	

## 2. Basic Usage

To import sensor values into your computer, use the control software "iws730ctl." Search for "IWS730" on the Tokyo Devices website (<https://en.tokyodevices.com/>). You will find a link to the control software on the product page, which you can download. The control software is compressed in a zip format, so please decompress it in an appropriate location.

Next, launch the Windows Command Prompt. (There are several ways to launch the Windows Command Prompt, but you can press the Windows key + R key simultaneously and type "cmd.")

Once the Command Prompt is open, change the current directory to the directory where you extracted iws730ctl.

```
> cd C:\Users\abc\Documents
```

After moving to the current directory, execute the downloaded iws730ctl.exe file.

Execution example:

```
> .\iws730ctl.exe one ANY
1449109974,0,628,24.260000,33.124874
```

In this example, the device retrieves values once. The program will automatically exit. From the example above, you can see that the time is December 3, 2015, at 11:32, the carbon dioxide concentration is 628 ppm, the temperature is 24.26°C, and the humidity is approximately 33.1%.

```
> .\iws730ctl.exe loop ANY
1449109974,0,628,24.240000,33.056190
1449109984,0,628,24.260000,33.123067
1449109994,0,629,24.240000,33.059796
```

In this example, values are retrieved every 10 seconds. The values are written out line by line every 10 seconds. To exit the program, press CTRL+C on the command line or terminate the process.

### 3. Using Multiple Devices

Each device is inscribed with a unique serial number at the time of shipment. By specifying the serial number as an option in the iws730ctl command, you can retrieve values from a specific device among multiple devices connected to the computer. Alternatively, if you specify "ANY" (three uppercase letters), it will select and retrieve values from one of the devices connected to the computer. This is convenient when only one device is connected.

To get a list of devices connected to the computer, use the "list" option. This will output the serial number for each device on a separate line.

```
> .\iws730ctl.exe list
1443675132
1443675190
```

In this example, it is evident that two devices are connected to the computer.

## 4. iws730ctl Options

Option	Summary	Description
<b>list</b>	Enumerate Devices	Lists the serial numbers of devices connected to the computer.
<b>loop &lt;Serial Number&gt;</b>	Continuous Sensor Value Retrieval	Continuously reads sensor values from the device.
<b>one &lt;Serial Number&gt;</b>	Single Sensor Value Retrieval	Reads sensor values from the device once.
<b>cal &lt;Serial Number&gt;</b>	CO <sub>2</sub> Sensor Calibration	Starts calibration of the CO <sub>2</sub> sensor.
<b>led &lt;Serial Number&gt; &lt;Value&gt;</b>	LED Control	Controls the red LED attached to the device. Value = 1: On, 0: Off

## 5. Software Output Format

Column#	Field Name	Description
1	Time	Represents the number of seconds elapsed since January 1, 1970, 0:00:00 GMT.
2	Status	Interpreted as a binary number where: 7th bit: 0 = Normal state, 1 = CO <sub>2</sub> sensor calibration in progress 3rd bit: 0 = Normal state, 1 = CO <sub>2</sub> sensor warming up Other bits: Reserved (values are undefined)
3	CO <sub>2</sub> Concentration	Measured in parts per million (ppm).
5	Temperature	Measured in degrees Celsius (°C).
4	Humidity	Measured as a percentage of relative humidity (%RH).

\*If a reading error occurs with the device, a line containing only "ERR" (three uppercase alphanumeric characters) will be output.

## 6. Importing into Microsoft Excel®

Redirect the sensor data to a file. The sensor data is output in a standard comma-separated CSV file, which can be easily imported into applications like Microsoft Excel®. The following example records data to the file "output.csv" until the CTRL+C key is pressed.

```
.\iws730ctl.exe loop ANY > output.csv
```

## 7. Using with User Programs

Invoke `iws730ctl` as an external program from within your custom program. By reading the standard output from `iws730ctl` through a pipe, the values can be utilized within your custom program. Refer to various programming books for methods on launching external programs and handling standard output through pipes.

## 8. Calibration

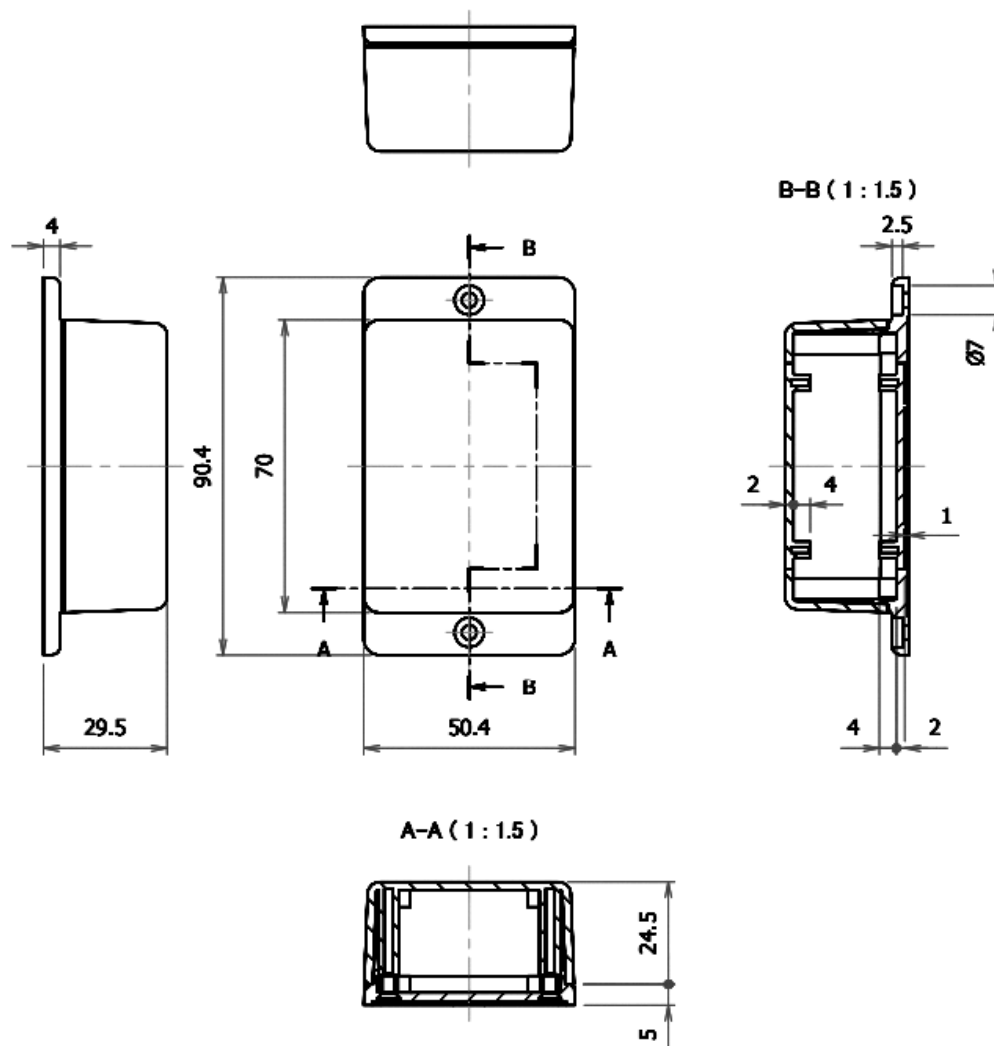
The CO2 sensor can be calibrated. Calibrate it by exposing it to normal outdoor CO2 concentrations (~500ppm at 25°C). To perform calibration, execute the `cal` option in the control software. Calibration takes about 6 minutes to complete. During calibration, the 7th bit of the status field will be set to 1. Be careful not to blow air or cause any fluctuations in CO2 concentration during calibration.

The temperature and humidity sensors are pre-calibrated and cannot be recalibrated later.

## 9. Precautions

- This product does not guarantee absolute performance from the true values.
- It takes about 15 to 30 minutes for the readings to stabilize after the power is turned on.
- It is normal for the sensor elements to emit light periodically.
- This product is not waterproof. Please install it in a place where it will not be exposed to water.

## 10. Dimensions



## 11. Product Customization Services

Tokyo Devices offers customization of circuit board exteriors, functionalities, and performance based on customer needs. For more details, please check the "Customization" on the Tokyo Devices website.

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