

# Air Pollution Monitoring and Alarm System

Software : ISaGRAF & Soft-GRAF Studio

Hardware : ISaGRAF PAC + 2G/3G Modules/Modems + I-87K I/O Modules



## Looking for a balance between industry evolution & quality of human life?

### Introduction

With a highly developed industry and the increased use of fossil energy, the quality of human life has been changed. The exhaust from the industrial parks have been verified containing many pollutants such as suspended particulates (PM<sub>10</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), etc. The World Health Organization (WHO) has shown that air pollutants can be harmful to the human body, such as heart disease, respiratory system disease, children's mental retardation, decline in human fertility, or even chronic diseases cause cancers.



In recent years, the harmful substances of atmosphere increased year-by-year. The residents especially living near the industrial parks are scared of poisoning events caused by toxic air pollutants as well as launched several protests, so that the government has ordered some related factory to suspend operations. The Environmental Protection Administration (EPA) recently also adopts preferential treatment and incentive measures to guide the manufacturers that actively installing the detection equipment or improve the process to meet the standard minimum emissions. At the same time, to cut the pollutants and protect the people's health and living environments.

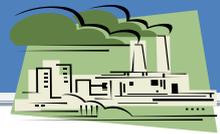


Air pollution not only threatens the health of human beings but also increases the social burden on medical resources and disturbs the ecological balance. Humans should start to reconsider – what kinds of an advanced civilization do we need? Whether back to the essence of human life during the process of pursuing industry evolution? Only the healthy living environment ensures the guaranty of sustainable evolution. Today, energy conservation & carbon reduction, renewable energy and green living are the important environment protecting issues. As the citizen of the world, ICP DAS has been involving in all-round research on these topics and launching a variety of green technology solutions that applies to each industry to fulfil the goal of sustainable operation.

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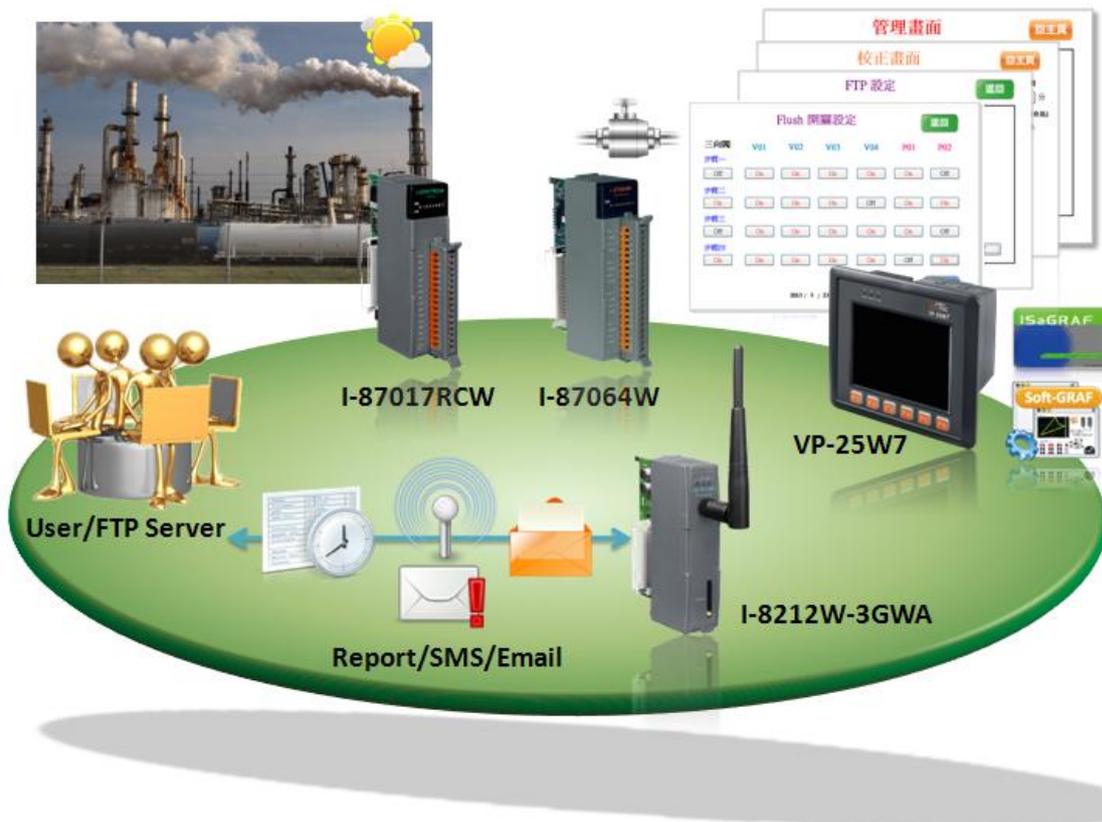


## Application Case:

For the purpose of preventing exhaust pollution effectively, we will introduce an "Air pollution monitoring and alarm system" solution, so that the on-site operator can take immediate and effective measures when the pollutant reading is over the limited value, and to make sure the quality of working environment and people's health.



## System concept map:



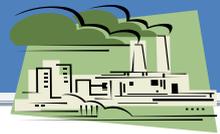
## System Description:

For high quality air monitoring system need, the system uses the I-87017RCW to monitor the air pollutant concentration and provides 24-hour monitor, and then record the data every 30 seconds to a daily file. Due to the monitoring system usually be installed outdoors without wired networks, users can use the I-8212W-3GWA to meet wireless (3G) Internet access and to send daily reports by E-mail or FTP Server. When an exception occurred, the system will do air sampling and send the short message (SMS) to related workers to carry out the next required procedures. Vice versa the workers can activate the sampling function by sending a short message (SMS) to this system.

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## System Functionality:

The system is divided into six functional subsystems according to the user's requirement:

### (1) Cleaning:

Automatic cleaning function. Before using a sampling bag, it must extract all the air in order to keep a vacuum and then use the nitrogen or pure air to wash the bag. Before cleaning, users need to set up the volume of sampling bag and pumping speed. The system will use them to calculate the cleaning time (Flush In/Flush Out) when users press the "Clean" button.



### (2) Calibrating:

Before sampling, it requires to set up a proper flow rate and permissible exposure limit for pollutants according to the analytical method of the given air, refer to the website - [IOSH](#). In addition, this "Calibrating" HMI page provides the daily timing calibration settings, calibration coefficients and average values display and error tolerance value settings. The system will send a short message to related workers when the error tolerance value is over the limit.

### (3) Sampling:

This HMI page provides the high level trigger function, which means it will automatically do air sampling when the detected value is over the limit. Users can also turn off this feature and press the "manual sampling" button for sampling manually. In addition, it allows to set up the sampling time, display or set up the sampling bag number, display the current air concentration and to set up short message and cell phone numbers. The system can be set to send a short message automatically while doing sampling or when it was activated the sampling function via the user's short message.

### (4) FTP Status:

This HMI page can display the send/receive status of short messages, 3G wireless network or FTP connection status and FTP file upload progress, it can also set up the FTP upload time for daily report.



### (5) Send Email:

This HMI page can enable Email functionality, display connection time or status, set up the number of email sending and set up the email address.

### (6) Other Setup:

Management page, users need to input the password to login this page. This HMI page provides the three-way valve and pump switch setting that used for cleaning and sampling procedures and it can set up the email Server or FTP Server.

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## Application Products:

### Software:

- **SoftLogic Software - ISaGRAF**

The ISaGRAF supports a range of IEC 61131-3 standard PLC programming languages, including Quick Ladder (LD), Function Block Diagram (FBD), Sequential Function Chart (SFC), Structured Text (ST), and so on, which enables you to quickly design and develop dynamic and user-friendly custom applications.

- **HMI Designer - Soft-GRAF Studio (Free!)**

Soft-GRAF Studio is an HMI software platform developed by ICP DAS. Editing the HMI pages is achieved via a simple drag-and-drop process, and a variety of HMI objects are provided in the included library to help you get started. With ISaGRAF software, it is easy to create a professional monitoring application without requiring any complex programming skills or knowledge.

### Hardware:

- **ISaGRAF WinCE PAC**

This system uses the VP-25W7 and you can also choose the following ISaGRAF PACs according to your projects.

PAC	ViewPAC		WinPAC		XPAC	
Model	VP-25W7	VP-4137	WP-5147 WP-5147-OD	WP-8x37/ WP-8x47	XP-8x47-CE6	XP-8x47-Atom-CE6
Pictures						
Software	ISaGRAF					
OS	Windows CE 5.0				Windows CE 6.0 R3 Core	
CPU	PXA270, 520 MHz				LX800, 500 MHz	Atom Z510, 1.1 GHz
Flash	96 MB	128 MB	64 MB	128 MB /96 MB	4 GB	8 GB
VGA (Resolution)	-	-	800x600	1024 x 768 /800x600	1024 x 768	1024 x 768
TFT LCD (Resolution)	5.7" (640x480)	10.4" (800x600)	-	-	-	-
USB	1	3	2	2/1	2	4
Ethernet	1	1	2	2	2	2
RS-232/ RS-485	2	2	3	3 - 4	4 - 5	4
I/O Slots	3	3	-	1/4/8	0/3/7	1/3/7
I/O Bus	-	-	1	-	-	-

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## ● 2G/3G Wireless Solutions:

This system uses the I-8212W-3GWA to implement the 3G wireless Internet access.

You can also choose the following products:

- > Industrial Quad-band 2G GSM/GPRS module: I-8212W
- > Industrial Quad-band 2G GSM/GPRS module with GPS function: I-8213W
- > Industrial Quad-band 2G GSM/GPRS modem with RS232 interface: GTM-201-RS232
- > Industrial Tri-band 3G module: I-8212W-3GWA
- > Industrial Tri-band 3G module with GPS function: I-8213W-3GWA
- > Industrial Tri-band 3G WCDMA modem with RS232 and USB interface: GTM-201-3GWA

## ● I-87K Series I/O Modules:

This system uses the I-87017RCW (8-channel, current input module) to monitor air concentrations and uses the I-87064W (8-channel, relay output module) to control the three-way valve and pump switch.

## Related Products :

For more information, please visit the following webpages:

✚ ISaGRAF:

[http://www.icpdas.com/root/product/solutions/softplc\\_based\\_on\\_pac/isagraf/isagraf.html](http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/isagraf/isagraf.html)

✚ Soft-GRAF:

[http://www.icpdas.com/root/product/solutions/softplc\\_based\\_on\\_pac/soft\\_graf/soft-graf.html](http://www.icpdas.com/root/product/solutions/softplc_based_on_pac/soft_graf/soft-graf.html)

✚ 2G/3G Wireless Modules/Modems:

[http://m2m.icpdas.com/m2m\\_layer2\\_gprs.html](http://m2m.icpdas.com/m2m_layer2_gprs.html)

✚ I-87K Series I/O Modules:

[http://www.icpdas.com/root/product/solutions/remote\\_io/rs-485/i-8k\\_i-87k/i-8k\\_i-87k\\_selection.html](http://www.icpdas.com/root/product/solutions/remote_io/rs-485/i-8k_i-87k/i-8k_i-87k_selection.html)