Application: Record 10-Ch. temperature value into a file on ISaGRAF PAC every minute. When 24-hour recording is finished, send this record file by email every day.

Download FAQ-071 Demo.

Note that WinCon-8xx7 has been phased out, visit to the ISaGRAF website for more information ablout new products https://www.icpdas.com/en/product/guide+Software+Development__Tools+ISaGRAF

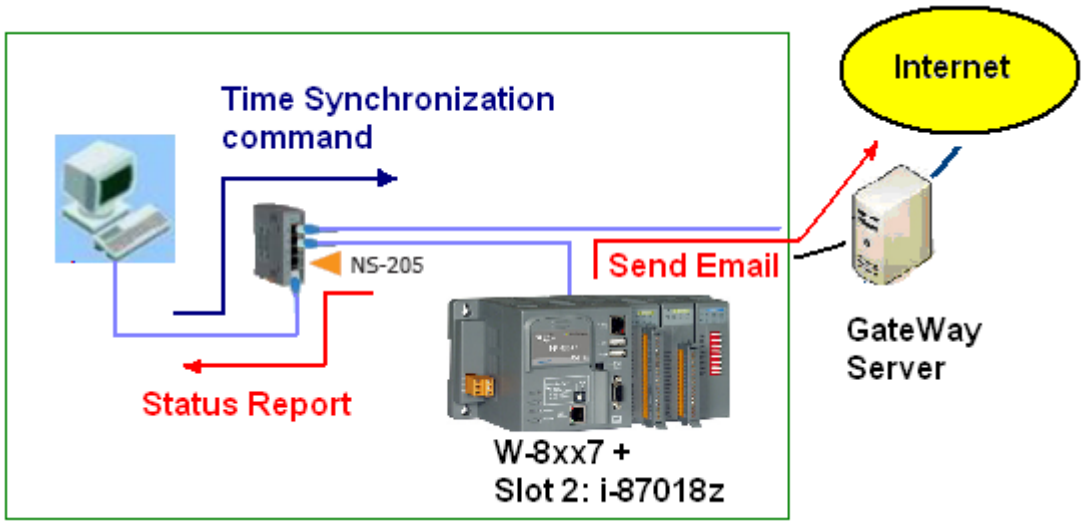
1. Introduction

This application sample uses one WinCon-8xx7 + slot 2: I-87018Z to record 10-Ch. Temperature value every minute. Then send an email with the attached record file after the 24-hour recording is finished. The email is sent around 00:00 to 00:01 every day.

These two ISaGRAF demo programs are “wdmo_65a” and “wdmo_65b”.
Please visit http://www.icpdas.com/en/faq/index.php?kind=280#751 FAQ-071 to download them.

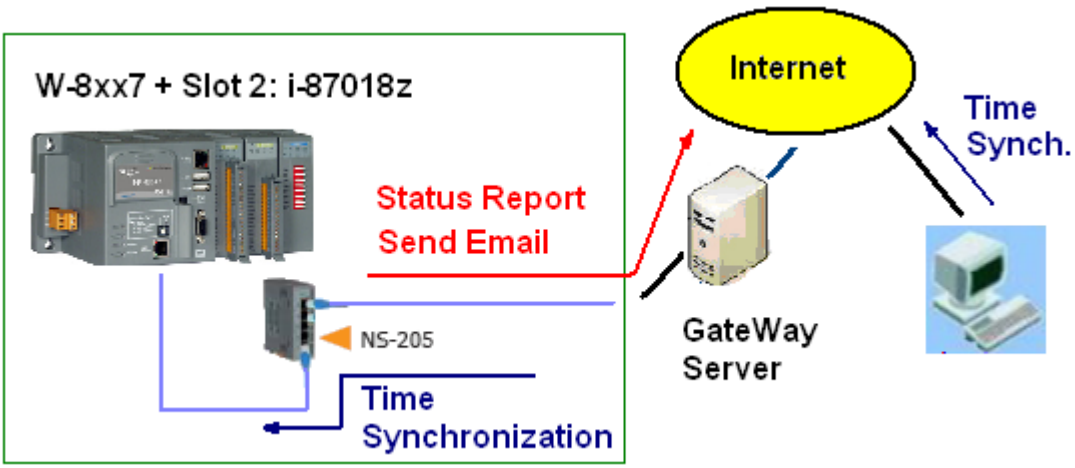
Wdmo_65a just records data and then send it by email.
Wdmo_65b records data and then send it by email and also do time synchronization and state report.

If you are running “**wdmo_65b**”, it apply one PC, IP = 10.0.0.91, Mask = 255.255.255.0 to link to one W-8xx7 in the local Ethernet area (or two W-8xx7 is Ok. The “Station_No” variable must set to different value, one is 1001, other is 1002. And also set to two different IP address). Please set this W-8xx7‘s IP = 10.0.0.105 , Mask = 255.255.255.0



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

If the PC resides at the Internet, it must use a fixed Internet IP. And also please modify the initial value of the "**IP_correct_PC**" variable and modify the IO connection – udp_ip – "**to_ip1**" value in the ISaGRAF project "wdmo_65b" to be the same as that Internet IP. Then re-compile it.



2. Install software and hardware for demo testing

When using WinCon-8xx7, the version of ISaGRAF driver must be 4.02 or later. If the "mail_snd" and "mail_set" functions haven't been installed in ISaGRAF on your PC, visit the website to download the I/O library and then run "setup.exe" inside the zip file.
https://www.icpdas.com/en/download/show.php?num=368&nation=US&kind1=&model=&kw=isagraf

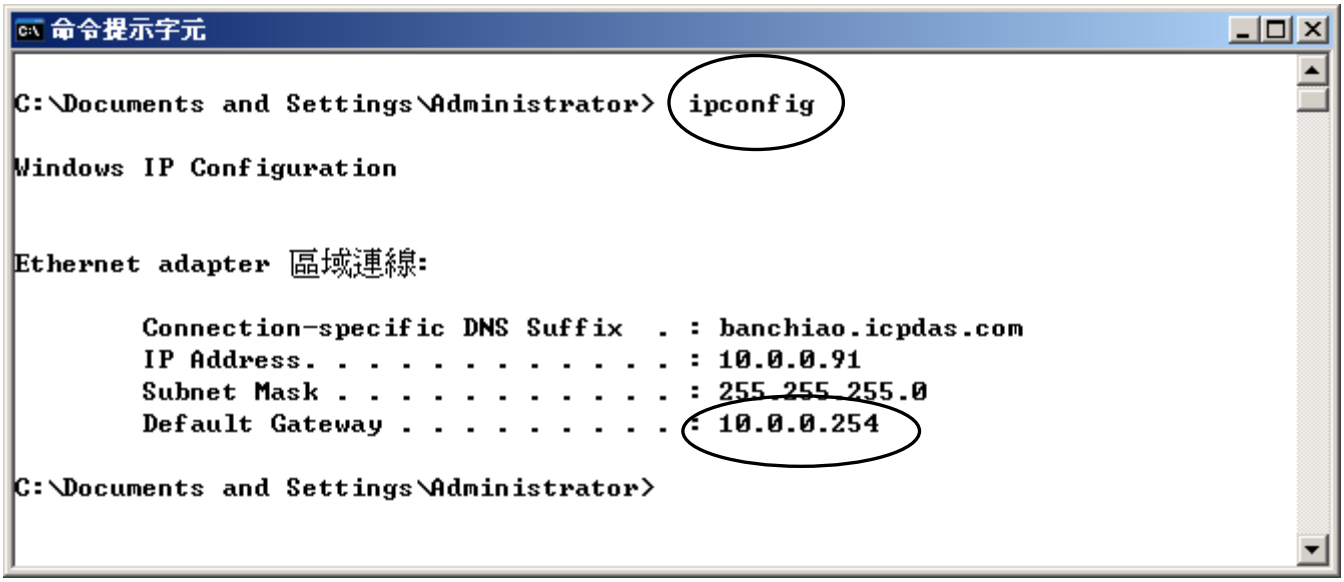
Visit the FAQ-071 to download the demo program. If you want to know more about the UDP protocol used in this sample, refer to the section 4. Also, visit the FAQ-067 for more about email functions.

The ISaGRAF demo program is **wdmo_65b.pia.**
(Please set the PAC's IP as 10.0.0.105, Mask as 255.255.255.0)

Note:

Set the gateway IP of the PAC. "Gateway IP" can be found on a PC that is on the same network segment with the local PAC. To do this, set the PC's IP as DHCP (i.e., obtain an IP address automatically), then open a Command Prompt , key-in "ipconfig" as below, then we got the Gateway IP setting.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



Because the original “wdmo_65b” program will send an email only at around 00:00 ~ 00:01 every day, for demo purpose, we may not want to wait so long to see the result. Then please modify the below code of the “RECORD1” program in this “wdmo_65b” project. Then it will send an email about every 3 minute.

Modify:

```
if    Abs_time >= 0    and    Abs_time <= 59    then
```

To become:

```
TMP_v    :=    Abs_time / 60 ;
if    Mod( TMP_v , 3 ) = 0    then
```

To make this demo program to send an email correctly, please modify the below email setting code to your own. Visit to the FAQ-067 for more details.

```
TMP := MAIL_SET( 1 , 'chun@icpdas.com' ) ;          (* please modify Receiver 1 *)
TMP := MAIL_SET( 100 , 'go_mao@hotmail.com' ) ;  (* please modify the sender *)
TMP := MAIL_SET( 101 , '168.95.4.211' ) ;           (* modify the Mail server 1 ‘s IP *)
```

Then re-compile this “wdmo_65b” project and then download it to the W-8xx7.
Then please run VB 6.0 demo_9 program in your testing PC (refer to Section 3).

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

3. VB 6.0 demo program

Please finish the steps listed in section 2 first before doing the following steps in this section.

Please set your PC 's IP address to a fixed IP = **10.0.0.91**, Mask = **255.255.255.0** for testing this demo. (Because the ISaGRAF demo program "wdmo_65b" running in the W-8xx7 will report message to the PC with IP = 10.0.0.91 and with UDP port No. = 12001)

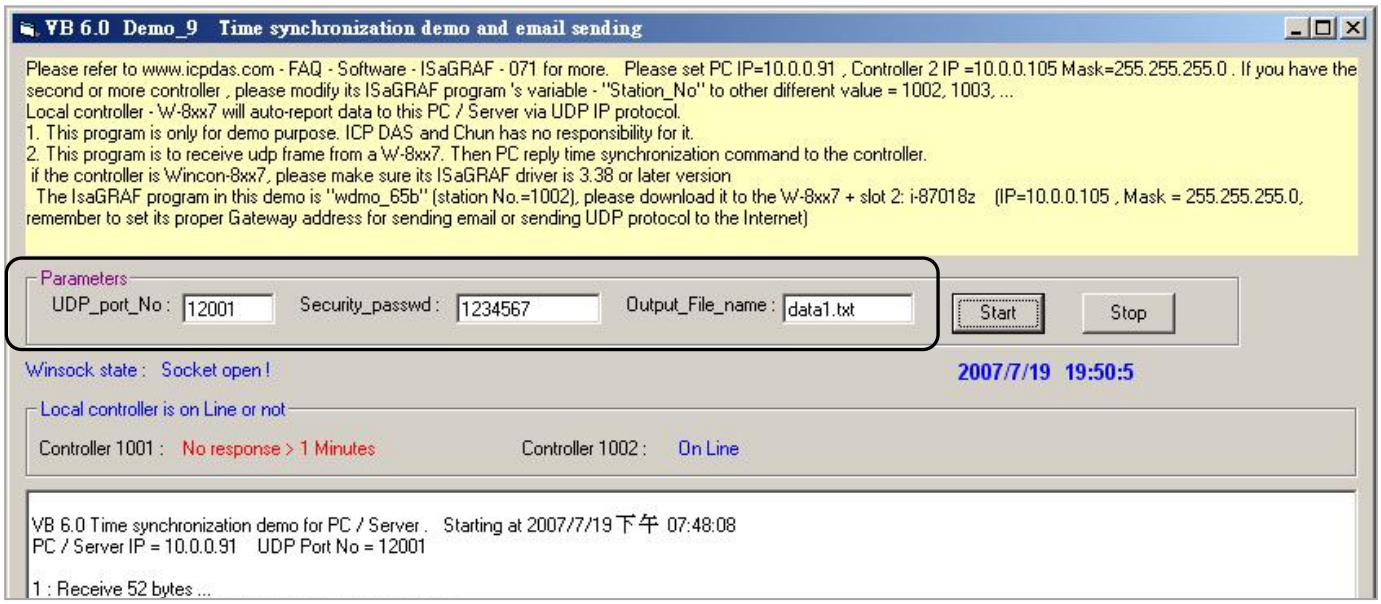
The VB 6.0 demo program "demo_9.exe" resides at "..\vb6_demo\demo_9\", visit the ISAGRAF FAQ webpage http://www.icpdas.com/en/faq/index.php?kind=280#751 FAQ-071 to download it. Then, run MS. VB 6.0 development studio to open the source code of this "demo_9", the file is "..\vb6_demo\demo_9\demo_9.vbp"

After running this "demo_9.exe", a "VB 6.0 Demo_9" window will show up as below. Please enter the proper value of the following items and then click on "Start" to test it.

"**UDP_port_No**" is the UDP port No. which this PC is going to bind it to receive message coming from local PACs (value can be 1001 to 65535). This demo uses value of 12001.

"**Security_passwd**" is the protocol security password . Value can be 0, or 1 to 2147483647, or -2147483647 to -1. This demo uses value of 1234567.

"**Output_File_name**" is an option. You may specify it or leave it empty. If specifying a name to it, then demo_9.exe will create a new empty file to record all valid message from the local PACs.



Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

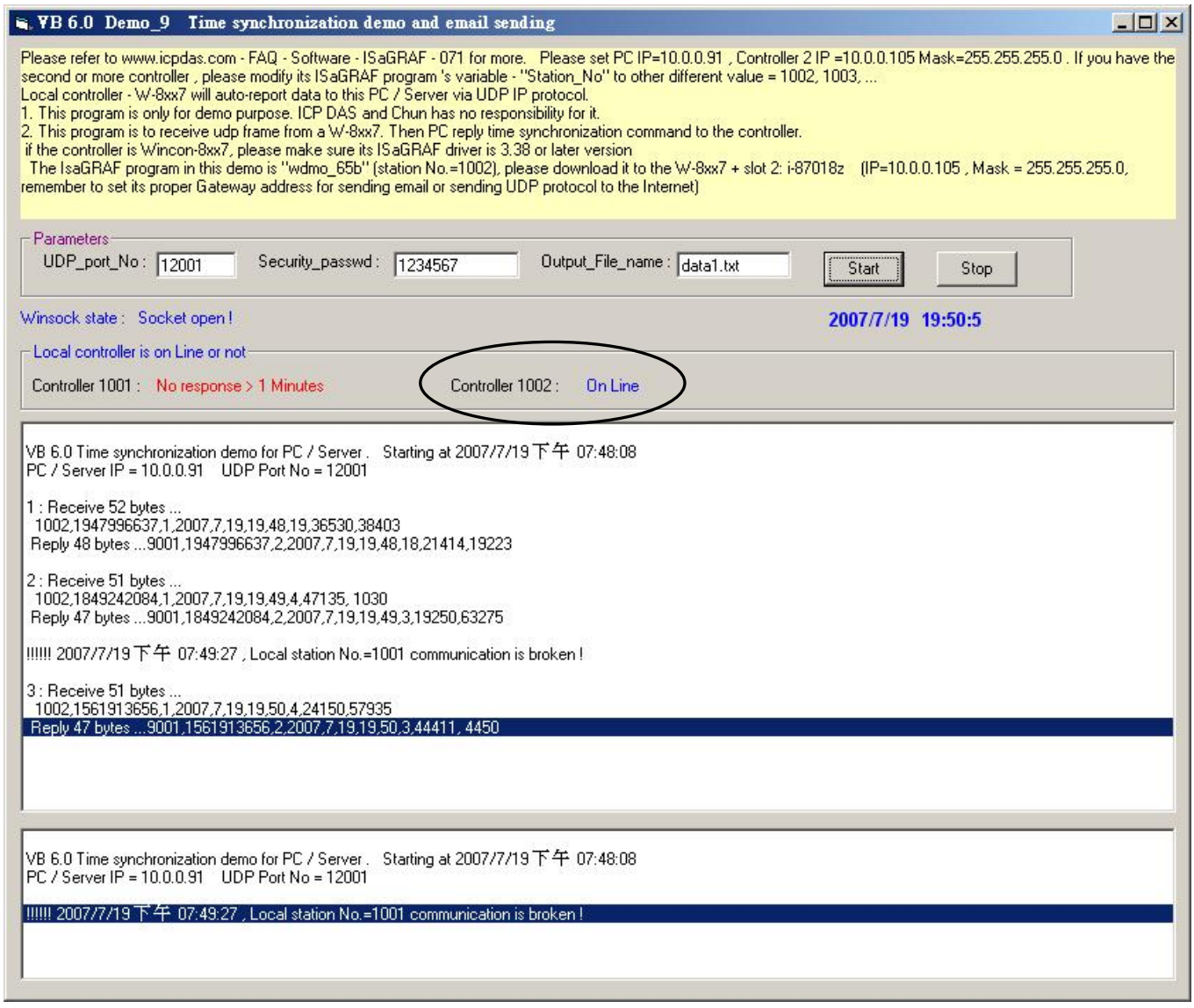
How to test?

If the code of the testing “wdmo_65b” is not modified, it will send an email at around 00:00 ~ 00:01. It may be received by, for example, the outlook express. If it is modified to send an email every 3 minute, then you just need to wait about 3 minutes to receive such an email. (Please remember to modify the receiver , sender and mail server setting in this “wdmo_65b”. Please refer to the description of the former section)

The W-8xx7 PAC will send message to the PC/Server when below events happen in this demo.

1. 15 seconds later after the Local PAC is power up. (This only deliver once)
2. Send once at every minute past. (Continuously and periodically)

A. Please wait about 2 minutes after running “demo_9.exe”. If this W-8xx7 connection is Ok, it will display “On Line”. If the W-8xx7 doesn’t report any message to the PC/Server over one minute, it will display “No response …”.



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

B. Please modify the time of this PC/Server. For example, two hours moving ahead, then wait about one minute, you will see the connected W-8xx7 ‘s time will be modified to become the same time as the PC/Server. The principle is every time W-8xx7 sends message to the PC, the PC will calculate the time difference.

   If it is larger than 20 seconds, the PC will send a time synchronization command to the PAC. If the application is applied in a local Ethernet area, you may modify this allowed “time difference” to a smaller value, for example modifying from 20 to become 5 seconds. Please modify the below statement in the VB 6.0 demo_9 source code and re-compile it.

Modify:	If Temp > 20 Or Temp < -20 Then
To become:	If Temp > 5 Or Temp < -5 Then

C. Please observe if receiving a message every minute.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4. UDP protocol definition in the demo listed in this document

This protocol definition is valid for the ISaGRAF demo program “wdmo_65b” and VB 6.0 demo program “demo_9” .

1. Local PAC is as UDP Client, while PC/Server is as UDP Server. Only Local PAC can auto-send data (message/string) to the PC/Server (The message variable - “IP_correct_PC “ and integer variable - “Port_correct_PC” in the ISaGRAF demo program “wdmo_65b” specify the IP address and UDP port No. of the target PC/Server. And also there is similar definition of the target PC/Server in the ISaGRAF IO connection window - “udp_ip”).

2. PC/Server must reply a message with <Command> = 2 or 4 to the local PAC in 15 seconds after it receives a valid message from the local PAC. The replied message must contain the exact same <ID No.> as the <ID No.> it received from the local PAC. The local PAC will drop the replied message with incorrect <ID No.>.

   If the local PAC doesn’t receive a valid replied message from the PC/Server in 15 seconds, it will send message once to the PC/Server with a different <ID No.>. Then if PC/Server still not replied it in 15 seconds, local PAC will continuously send message again until it receives a valid replied message. (The timer variable - “Timeout_interval” in the ISaGRAF demo program “wdmo_65b” defines this Timeout value)

3. The local PAC will send message to the PC/Server when below events happen in this demo.
   (1) 15 seconds later after the Local PAC is power up. (This only deliver once)
   (2) Send once at every minute past. (Continuously and periodically)

4. UDP message format of Local PAC sending to the PC/Server

   Security_passwd: Must be specified as the same value in the ISaGRAF IO connection window – “udp_ip” and in the VB demo program to communicate well. **Value can be 0**: means “No encoding” (it is not safe) , or 1 to 2147483647, or -2147483647 to -1 (**none-zero value** means “with encoding”, it is much safe).

   If setting as a **none-zero value**, please refer to the “convert_to_udp_deliver_buf( )”, “convert_back_udp_deliver_buf( )” and “udp_ip_crc( )” function in the VB 6.0 “demo_9” for its encoding algorithm.

   When setting “Security_passwd” as 0, every delivered message can not exceed 255 bytes.

   When setting “Security_passwd” as none-zero value, every delivered message can not exceed 259 bytes. The last added 4-bytes is the <4-byte-Checksum > calculated by the “udp_ip_crc( )” function.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Local PAC will send the below format to the PC/Server.

Security_passwd is 0 : (No 4-byte-Checksum at the end)

<Station_No of local PAC>,<ID No.>,<Command>,
<Year>,<Month>,<Day>,<Hour>,<Minute>,<second>,
<User-defined CRC>

For example:
1001,850334470,1,2007,5,30,17,31,51,46677,18632

It means,

<Station_No of local PAC> is 1001

<ID No.> is 850334470

<Command> is 1

PAC's date and time is 2007/5/30 , 17:31:51

< User-defined CRC > is 46677,18632

Security_passwd is not 0 : (With 4-byte-Checksum at the end)

<Station_No of local PAC>,<ID No.>,<Command>,
<Year>,<Month>,<Day>,<Hour>,<Minute>,<second>,
<User-defined CRC><4-byte-Checksum>

<Command> definition:

1 : Local PAC report data to the PC/Server

<User-defined CRC> definition:

Can be defined as a different algorithm by the User. This demo apply the following algorithm **(**Please apply a different algorithm in real application for safety**)**

Value is fixed as 11 bytes (Character). It contains two value of 0 to 65535 separated by a ","

For example,

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

value_1	value_2		fixed length of 11 bytes (Character)	
0	0	:	' 0, 0'	(with 4 Space Char. before '0')
1	1	:	' 1, 1'	(with 4 Space Char. before '1')
21	21	:	' 21, 21'	(with 3 Space Char. before '2')
321	321	:	' 321, 321'	(with 2 Space Char. before '3')
4321	4321	:	' 4321, 4321'	(with 1 Space Char. before '4')
54321	65535	:	'54321,65535'	(No Space Char.)

Below steps - **(a) to (d)** is to get **value 1,** while - **(e)** is to get **value 2**

(Please apply a different algorithm in real application for safety**)**

(a) extract the string not including the <User-defined CRC> and <4-byte-Checksum> into byte array - user_buf[ ] (for convient, we call this byte array as "user_buf[ ]")

(b) eplace user_buf[3] as **user_buf[3] xor 100**
That is user_buf[3] = user_buf[3] ^ (unsigned char)100 ;
(user may use [2], [4], ... , and may be not using 100, ... whatever,
this depends on your own decision. Please use your own algorithm for safety.)

(c) replace user_buf[7] as **user_buf[7] xor 200**
That is user_buf[7] = user_buf[7] ^ (unsigned char)200;
(user may use [5], [6], ... , and may not use 200, ... whatever,
this depends on your own decision. Please use your own algorithm for safety.)

(d) Calculate <User-defined CRC> as **two byte => <CRC_Hi><CRC_Lo>**
Then <User-defined CRC> = 256*<CRC_Hi> + <CRC_Lo>.
It is a value between 0 and 65535.

(e) using a different algorithm to get value 2
proceed (a) , then proceed (b) by using user_buf[4]=**user_buf[4]^(unsigned char)48**
then proceed (c) by using user_buf[6]**=user_buf[6]^(unsigned char)197**
then proceed (d). Then we get value 2. It is a value between 0 and 65535.
(Please use your own algorithm for safety.)

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5. UDP message format of the PC/Server replying to local PAC

Security_passwd: Using the same definition as item 4.

PC/Server will reply below format to the local PAC

Security_passwd is 0 : (No 4-byte-Checksum at the end)

<Station_No of PC/Server>,<Same ID No. from the local PAC>,<Command>,
<Year>,<Month>,<Day>,<Hour>,<Minute>,<second>,
<User-defined CRC>

For example,
9001,519805546,2,2007,5,30,18,59,53,6830,42679

It means,

< Station_No of PC/Server > is 9001

<ID No.> is 519805546

<Command> is 2

Date and Time on PC/Server is 2007/5/30, 18:59:53

< User-defined CRC > is 6830,42679 (there is one Space Char. Before the first "6")

Security_passwd is not 0 : (With 4-byte-Checksum at the end)

<Station_No of PC/Server>,<Same ID No. from the local PAC>,<Command>,
<Year>,<Month>,<Day>,<Hour>,<Minute>,<second>,
<User-defined CRC><4-byte-Checksum>

<Command> definition:

2: to inform the local PAC that PC/Server receive its correct data.

4: to inform the local PAC that its date and time differ more than 20 seconds than the PC/Server, please adjust PAC's date and time and then send data to PC/Server once again.

<User-defined CRC> definition:

Using the same definition as item 4.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5. PAC Ethernet security

Note: **WinCon-8xx7 has been phased out, the user can use ISaGRAF XPAC.** Visit the ISaGRAF website for new information.
https://www.icpdas.com/en/product/guide+Software+Development__Tools+ISaGRAF

5.1 : Modbus TCP/IP security

There are some ways user can get access to the Wincon-8xx7 via its ethernet port.

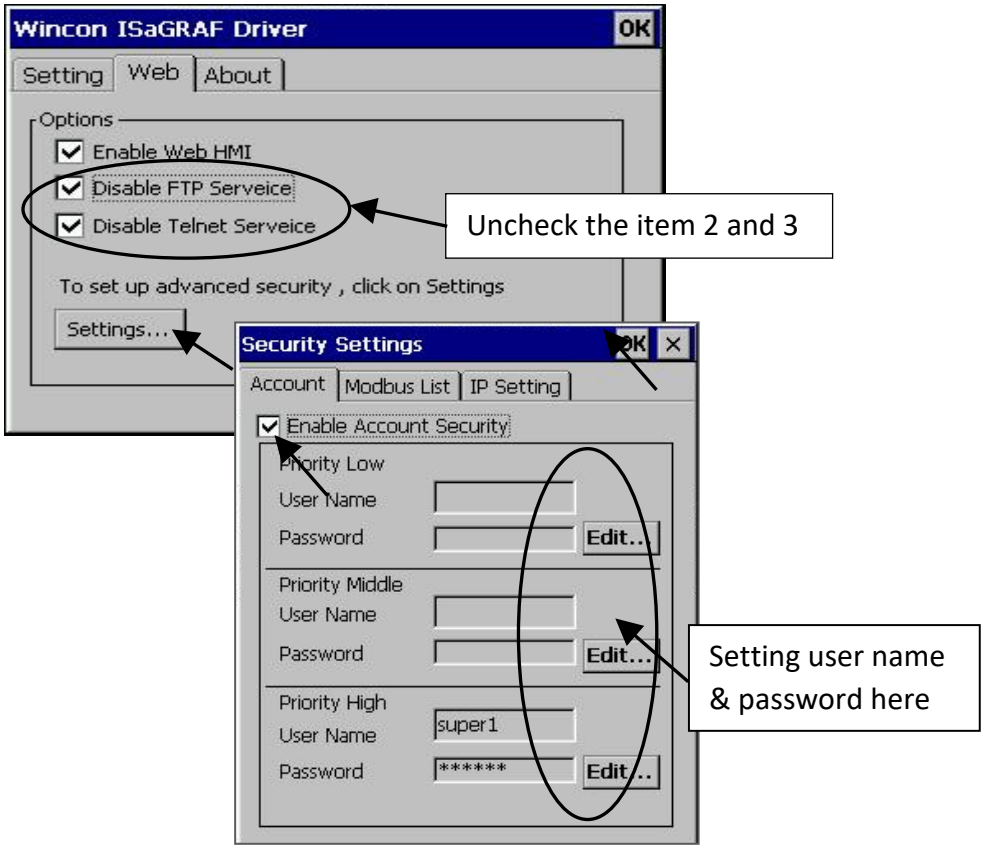
1. Using Modbus TCP protocol at port No.= 502. (ISaGRAF and other HMI can do this)
2. Using FTP (for example, keyin “ftp://10.0.0.103” on the Internet Explorer)
3. Using Telent (for example, keyin “telnet 10.0.0.103” in the “command” window)
4. Using the Web server (The Web HMI does)

Note:

1. **While for I-8437-80/8837-80, I-8437/8837 and I-7188EG, only item 1 is possible.**
2. If the PAC is W-8x47/8x46, when using “ftp”, “telnet”, “Web HMI” & “Modbus TCP/IP”, please connect your PC/HMI to W-8x47/8x46’s “LAN1” port, and please use “NS-205” or “NS-208” Ethernet switch.

For safety, recommend to disable item 2 and 3 at run time for ISaGRAF PAC. For using the Web HMI (item 4 above), checking “**Enable Web HMI**”, clicking the **Settings** button and set the proper username & password.

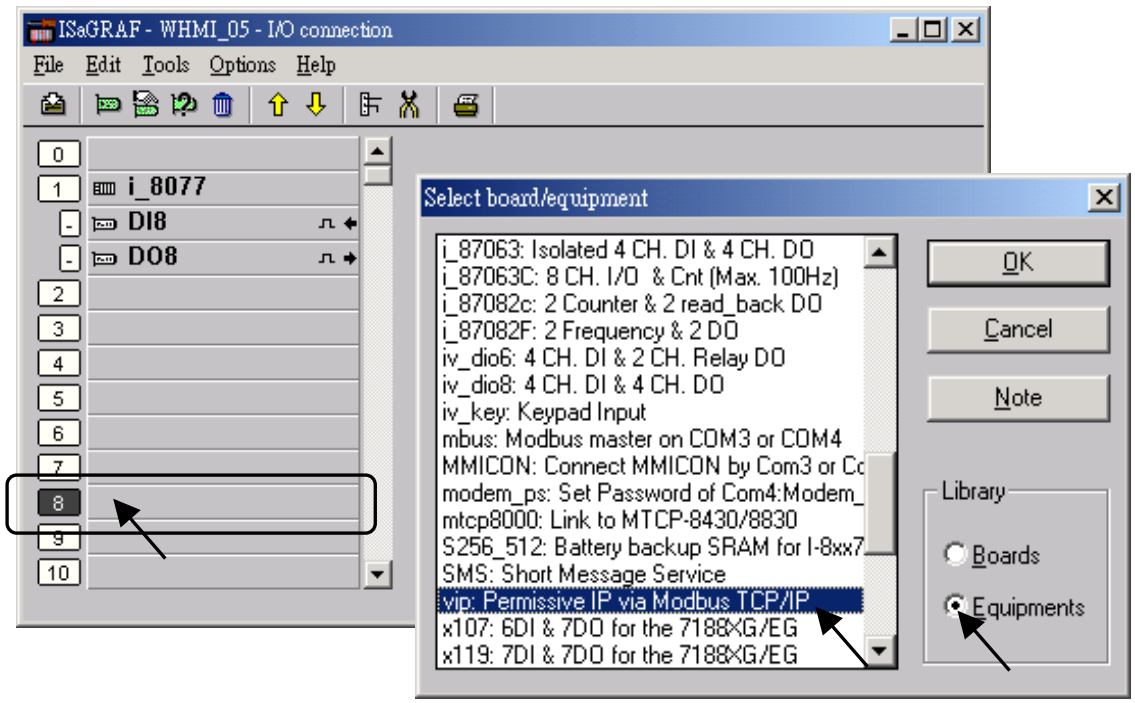
.

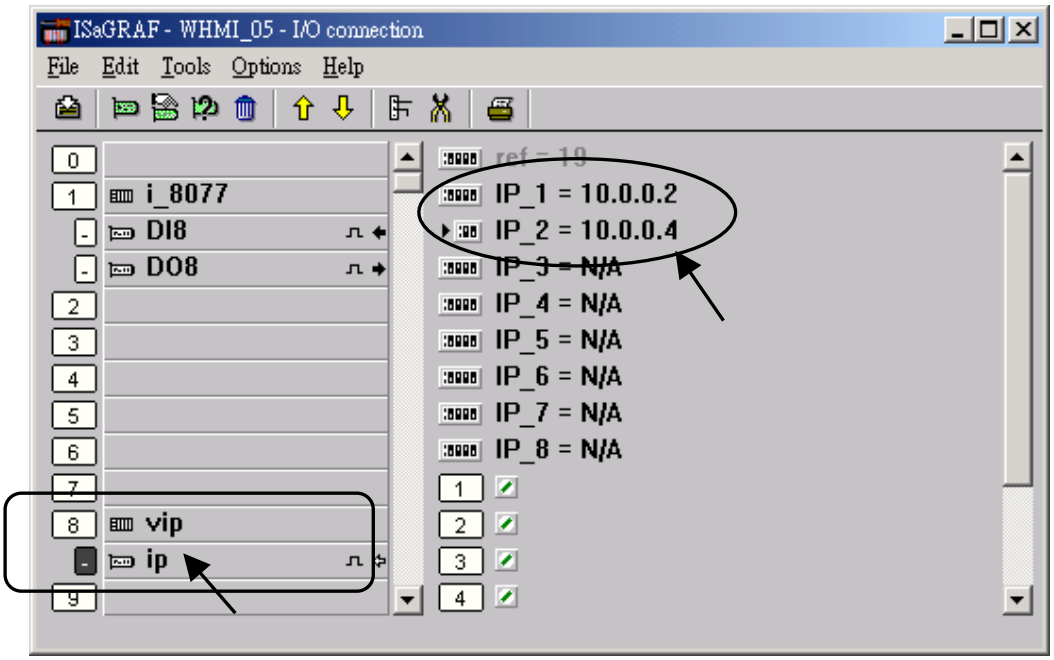


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

About item 1, user may set up to 8 IP address for ISaGRAF or other HMI to get access to the I-8x37 or I-7188EG via the Modbus TCP/IP protocol as below.

On the **IO connection** window of ISaGRAF, please connect "**vip**" and entering the IP which can get access to the PAC via Modbus TCP/IP protocol. If "vip" is not connected, any remote IP can get access to your PAC via Modbus TCP/IP protocol. If "vip" is connected and No IP is entered (all assigned as "N/A"), No HMI and ISaGRAF can get access to it by Modbus TCP/IP anymore.

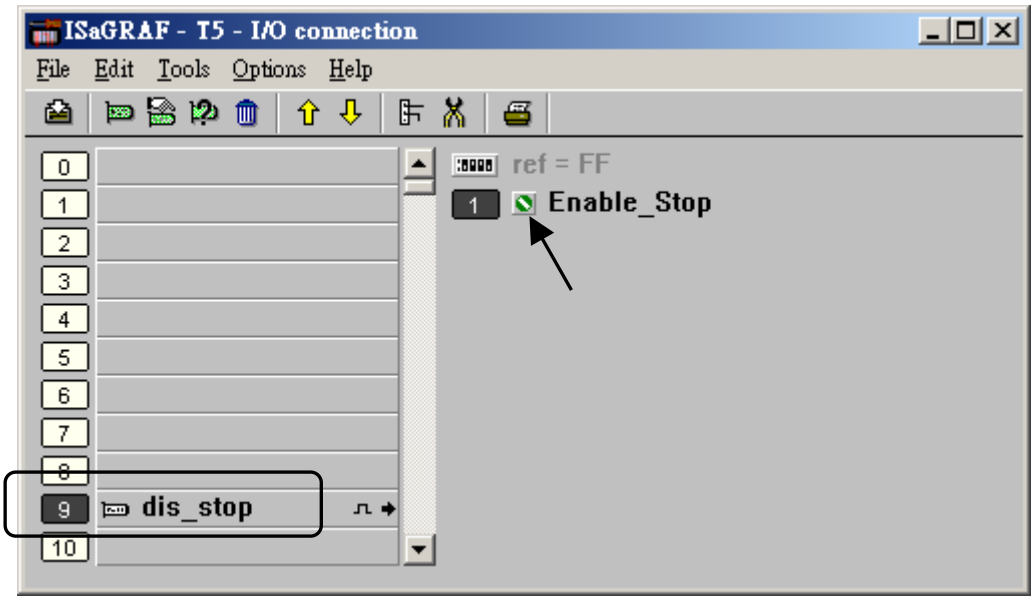




LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5.2 : Using “dis_stop” to disable/enable the ISaGRAF Download function

For some reason, to prevent someone to use ISaGRAF software to stop or to download a different PAC project already running on the I-7188EG or I-8437/8837, the “Dis_stop” can be applied . Please connect “**dis_stop**” at a slot No. larger than 8 and init the channel value to become **TRUE**. Then stop/download command is not allowed in this PAC.



To disable “Dis_stop” to accept stop/download command, please run the original ISaGRAF project to link to this PAC and set the channel value to become **False**.

Click the link for more ISaGRAF FAQ:
http://www.icpdas.com/en/faq/index.php?kind=280#751

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000