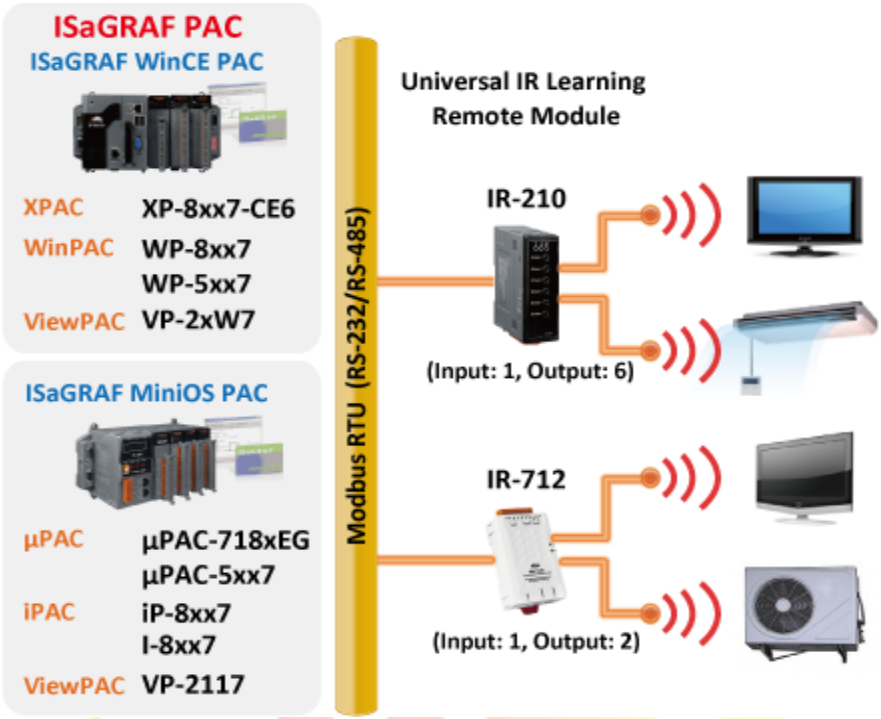
How to control the IR module, IR-210/IR-712, with the ISaGRAF PACs

- **Application Introduction :**

IR (Infrared) technology is now used for controlling home devices including television, air conditioner, etc. The IR products of ICP DAS, such as IR-210/IR-712, will help users to control and integrate these IR devices into a control system. Now, with the ISaGRAF PACs integrating the IR modules and devices, users can easily to establish the home automation system.



This FAQ shows how to configure an IR application by using IR-210:

The link to download this document and demo programs :
https://www.icpdas.com/en/faq/index.php?kind=280#751> FAQ-152 .

The link to download ISaGRAF drivers :
http://www.icpdas.com/en/download/index.php?nation=US&kind1=&model=&kw=isagraf

More information about IR-210:

http://www.icpdas.com/en/product/IR-210

More information about IR-712:

http://www.icpdas.com/en/product/IR-712A

The product data sheet:

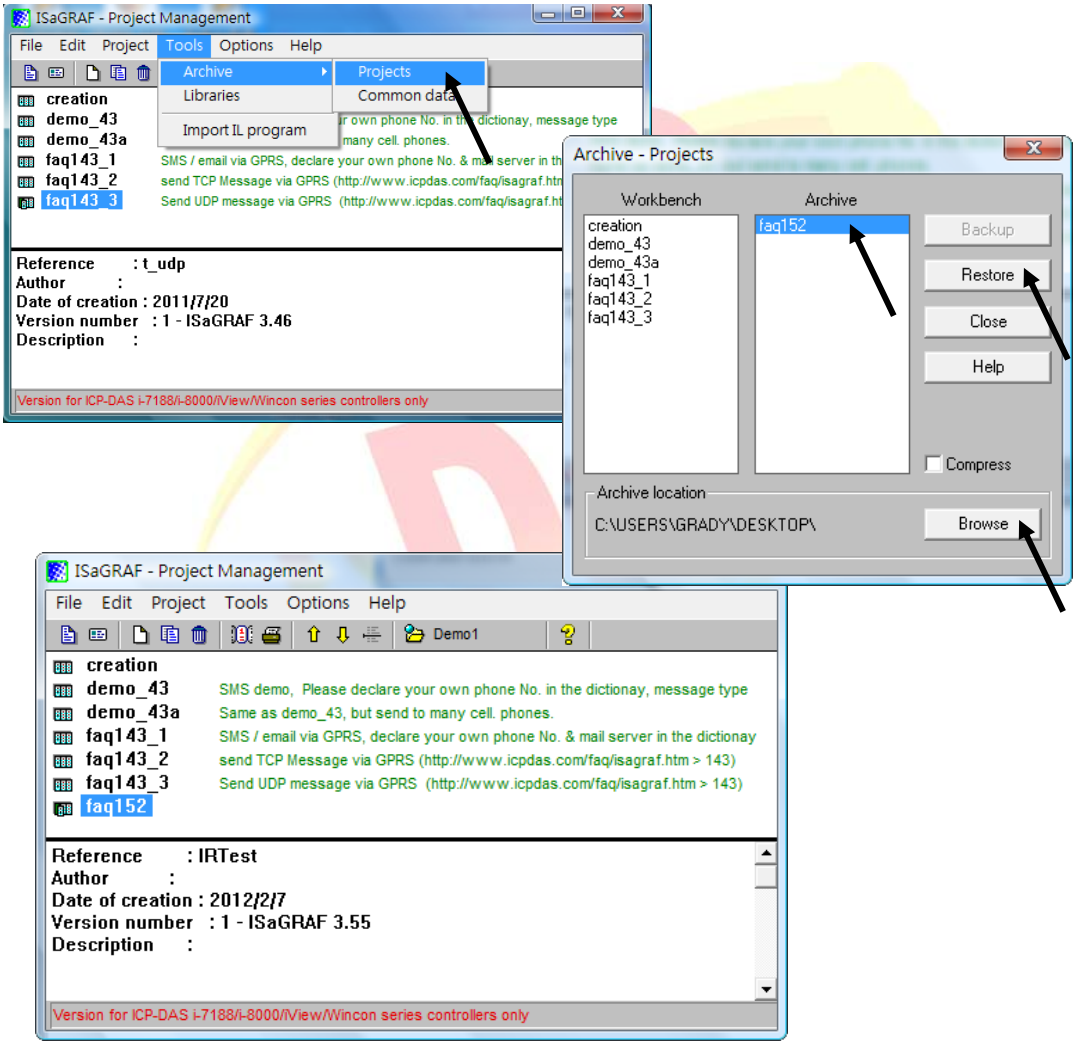
http://www.icpdas.com/en/download/index.php?nation=US&kind1=6&kind2=15&model=&kw=isagraf

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1.1. Restore the ISaGRAF Demo project

User can download the file “faq_152_chinese.zip” that includes the Demo project and this PDF document from the ISaGRAF FAQ website https://www.icpdas.com/en/faq/index.php?kind=280#751 > 152 and restore it to your PC / ISaGRAF

For ISaGRAF software operation, please refer to the Chap. 1.1, 1.2 & Chap. 2 of “ISaGRAF User’s Manual”. can be get from the following website.
http://www.icpdas.com/en/download/show.php?num=333&nation=US&kind1=&model=&kw=isagraf



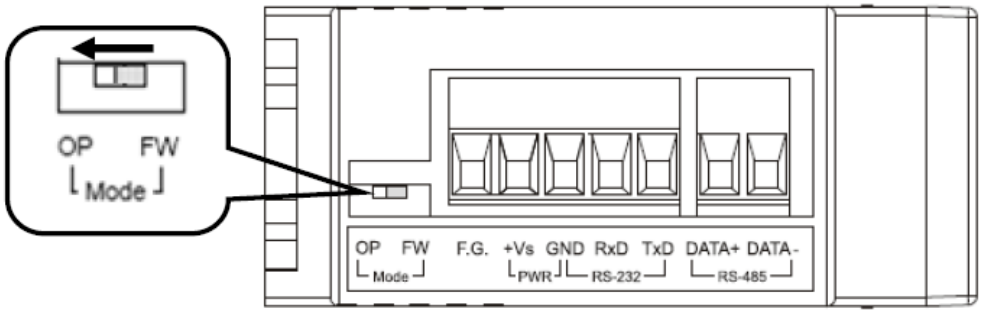
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1.2. Installation of the IR module IR-210

In order to configure IR-210 and learn IR commands, please establish the serial communication between IR-210 and PC as the following steps.

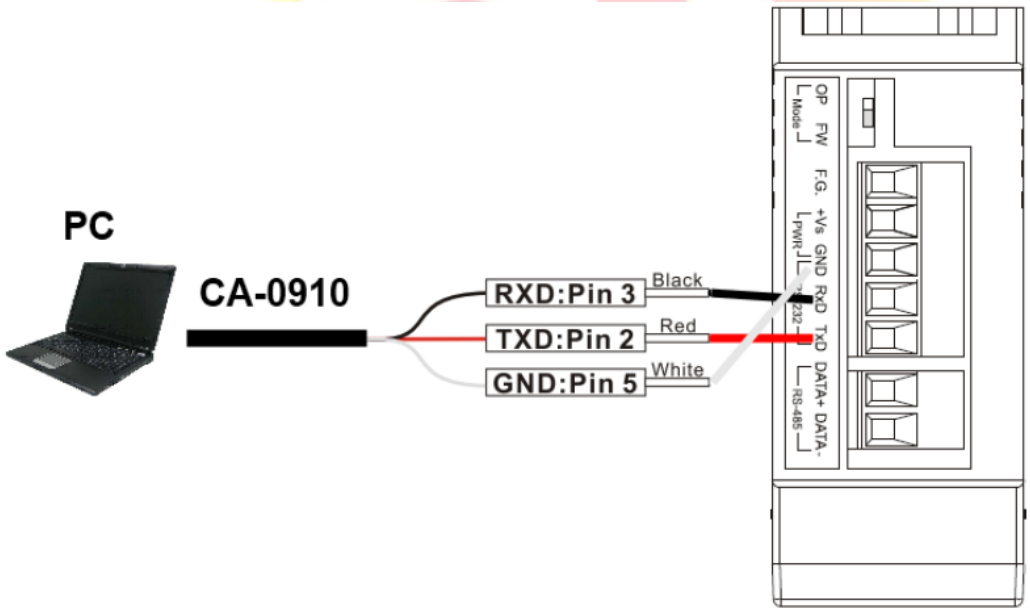
Step1: Check the operation mode of IR-210

Push DIP switch to the position of normal operation mode (OP) as following figure.



Step2: Wire the Serial connection between IR-210 and PC

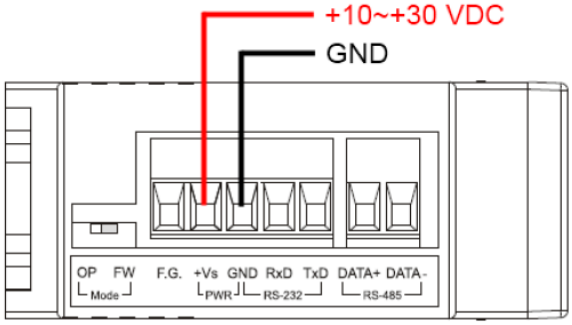
User can use the RS-232 cable (CA-0910) to establish the wire connection between IR-210 and PC as following picture. DB9 (9-pin) connector of CA-0910 is designed for PC COM port. USB to RS-232 converter can solve the problem of no DB9 COM port at PC side.



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Step3: Wire the power connection

Connect the power supply (+10~+30VDC) to the power connector of IR-210 as following picture. Turn on the power to run the module in normal operation mode.



Step4: Install IR-210 Utility software

Please get the installation file of IR-210 Utility (IR210_Util_Setup_Vx_xx.zip) from the Web：
Web :http://www.icpdas.com/en/download/show.php?num=2102&nation=US&kind1=&model=&kw=IR-210

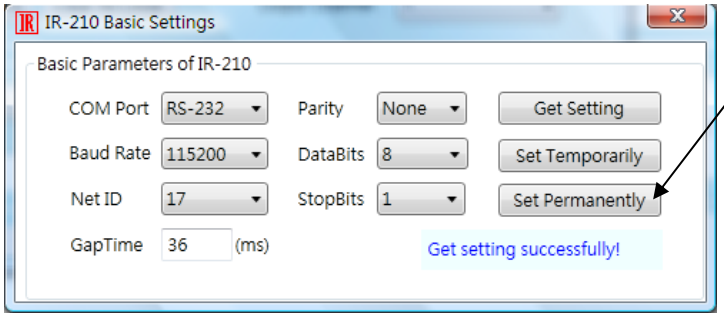
1.3. Learn IR Commands

1.3.1. Set the Serial Communication

Launch the IR-210 Utility. The default serial interface of IR-210 is RS-232. Select the default communication settings: Baud rate = 115200 bps, Parity = None, Data bits = 8, Stop bits = 1 and Modbus Net ID = 1, then click “Open” button to connect to IR-210 (as following picture).



Communication setting can be changed (e.g. RS-232→RS-485) in the setting window as following picture by click the main menu [Setting]→[IR-210 Basic Settings].

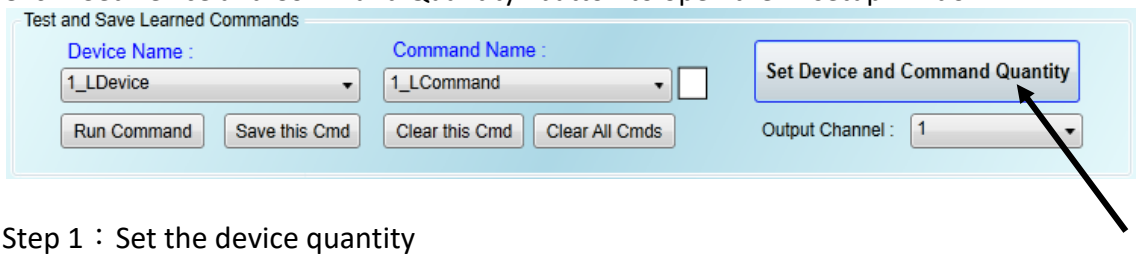


Click “Set Permanently” button to save the setting in the IR-210.

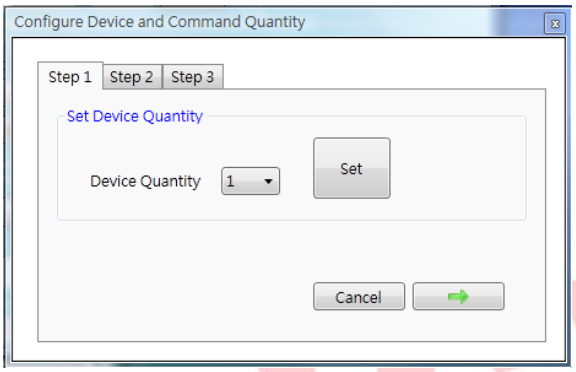
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1.3.2. Set Device and Command Quantity

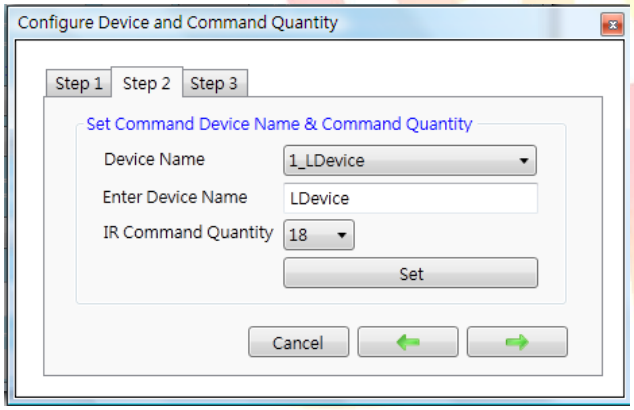
Click “Set Device and Command Quantity” button to open the IR setup window.



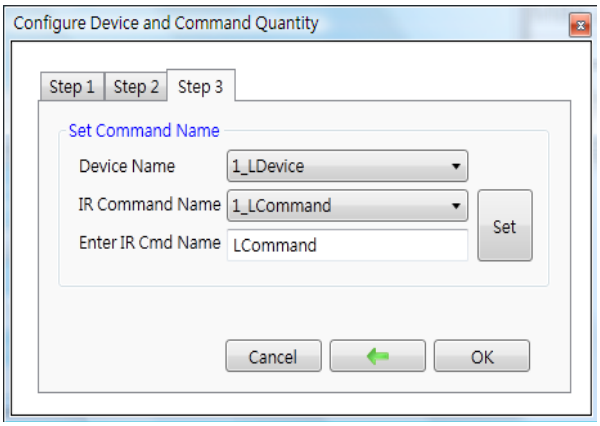
Step 1：Set the device quantity



Step 2：Set the device name and the IR command quantity for the device.

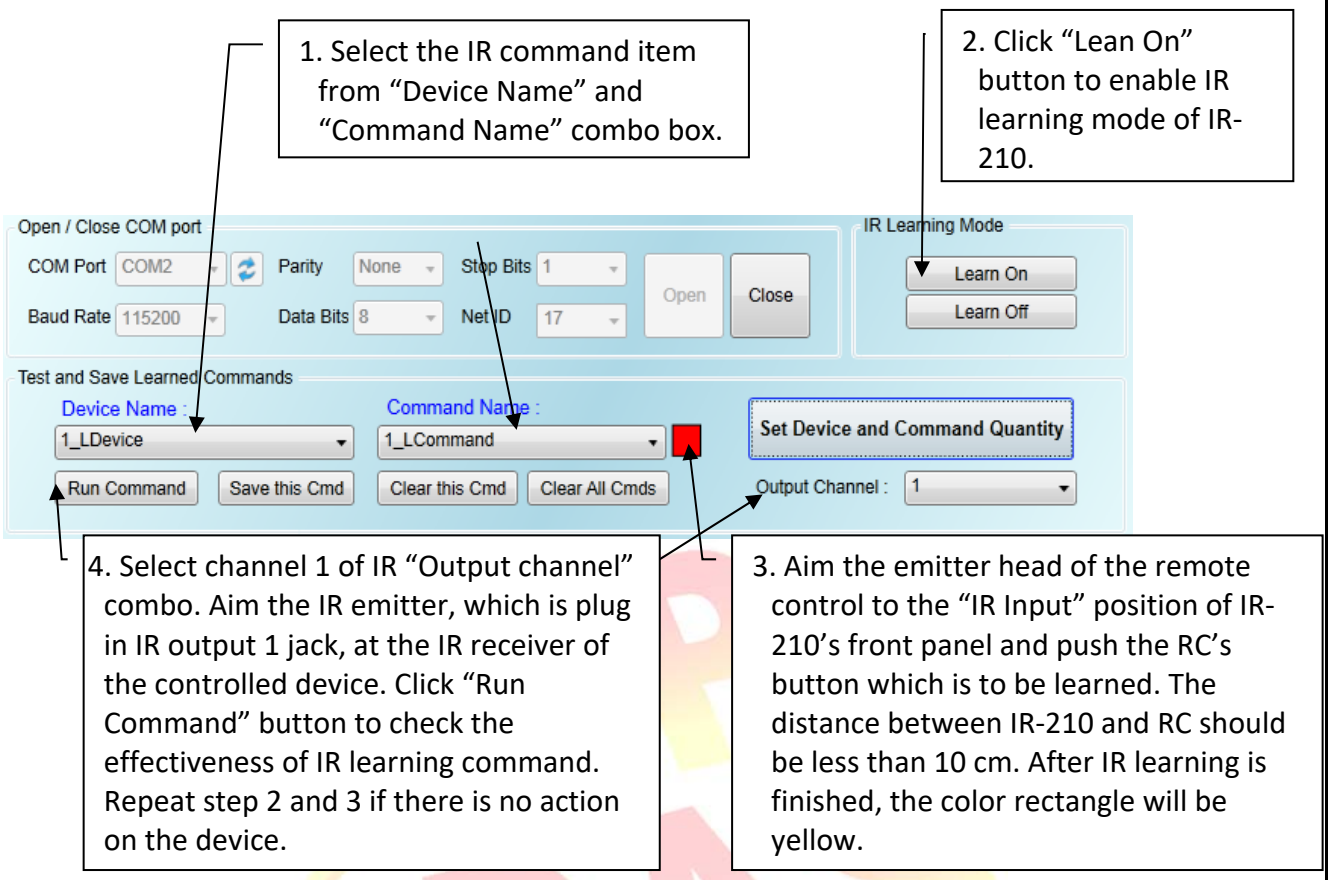


Step 3：Set the name (for comment) of each IR command. The prefix number is the IR command number stored in IR-210. Click “OK” button and go back to the main window of the utility.



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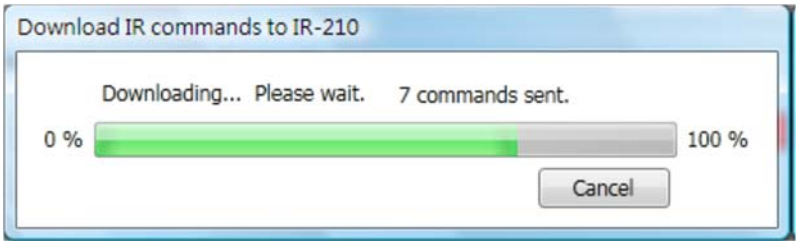
1.3.3. Learn and test IR command



Then click "save this Cmd" button to save the learning data to the item of "Command Name" combo box.
Repeat step 1~4 to learn all IR commands that you want.

1.3.4. Save the IR Learning Commands

After IR learning or loading IR learning data from file, click Menu [Download]→ [Download IR Commands to IR-210] to download IR commands to IR-210.



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1.3.5. Modbus Registers for IR-210

After learning IR commands, user can control IR-210 to send specified IR command from specified channel by sending Modbus RTU command with controller according to following table.

Modbus Command Start Address [4xxxx]	Description
1103 (0x44F) [41104]	The number of IR command Available value: 1~176
1104 (0x450) [41105]	IR output channel Available value: 0x01 ~ 0x3F The first bit represents the first channel. The sixth bit represents the sixth channel. Example： • The first output channel : 0x01 == 00 0001 (binary) • The first, second and sixth output channels : 0x23 == 10 0011(binary)

Example: Command 0 1 1 0 0 4 4 F 0 0 0 2 0 4 0 0 0 1 0 0 2 0 D 5 0 7

When receiving the above command, IR-210 will send IR command number 1 from the IR output channel 6.

Command	01	10	04 4F	00 02	04	**00 01**	**00 20**	D5 07
Description	Net ID: 1	Function code: 10 means to write several AO	Start Address to write (Hex.)	Word Count: how many AO to write	Byte Count: data length	IR command number: 1st	IR Output channel: 6th (Hex.)	Check code CRC16

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1.4. Test demo project :

Introduction of demo project:
This project shows how to operate IR-210 with the I/O board “mbus” and C-function block “MBUS_N_W”.

1.4.1. Test the demo “FAQ152.pia”

Hardware:

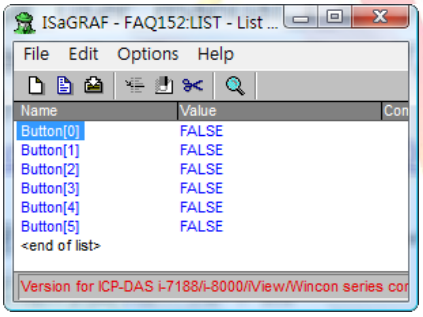
1. ISaGRAF PAC x 1 (Ex: WP-8447)
2. IR module x 1 (Ex: IR-210/IR-712; here we use an IR-210)

Hardware setting:

1. Setting of IR-210 : NET ID: 17, Com port: RS-485, Baud rate: 9600, Data Bit: 8, Parity: None, Stop Bit: 1.
2. Learn six IR commands and save them into IR-210.
3. Establish the wire connection between IR-210 and COM2 of ISaGRAF PAC.

1.4.2. How to operate IR-210 in this demo

1. Recompile the ISaGRAF project and download it into the ISaGRAF PAC. If you are not familiar to the ISaGRAF software, please refer to “ISaGRAF User’s manual” Chap.1.1~1.2 and Chap.2. can be got from the following website.
   http://www.icpdas.com/en/download/show.php?num=333&nation=US&kind1=&model=&kw=isagraf
2. Changing the values of variables Button[0]~Button[5] in the Spy lists from False to True for emitting the IR command 1~6 from channel 1 of IR-210.

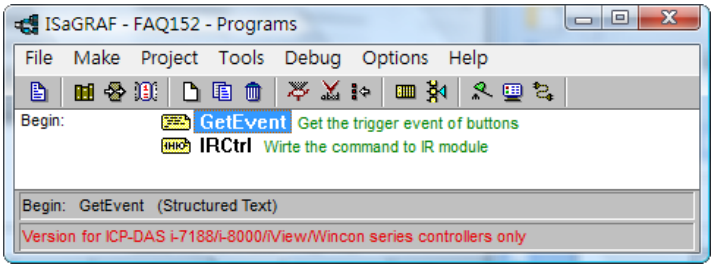


3. Changing the variable values is to check that the Modbus command can control the IR-210 to send the specified IR commands from the specified channel number.

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1.5. Description of Demo Program "FAQ152.pia"

- Project Architecture：
  This project contains an ST program (GetEvent), and a LD program (IRCtrl).



- **The setting of IR-210 in this demo**：
  1. Net ID : 17
  2. COM port setting: baud rate: 9600, Data bit: 8, Parity: None, Stop bit: 1
  3. Used IR command number： 1~6

- **ISaGRAF Variables**

Name	Type	Attributes	Description
Trigger_17	Boolean	Internal	Set as True to send Modbus command to IR module for emitting IR command
IR17_state	Boolean	Internal	Check if the Modbus command is successful or not.
Button[6]	Boolean	Internal	Set each of the variables as true to send specified Modbus command to IR module.
command	Integer	Internal	Which IR command that want to send.
channel	Integer	Internal	Which channel that want to send from.
ii	Integer	Internal	For internal used.

NOTE：
There is a variable array in this project. Please close all ISaGRAF windows first, and then add two extra lines in the file "ISA.INI". This file could be found in your ISaGRAF workbench root directory, normally in the **c:\isawin\exe**.
Then add two extra lines on the top of this file as following (left the 3rd line blank).

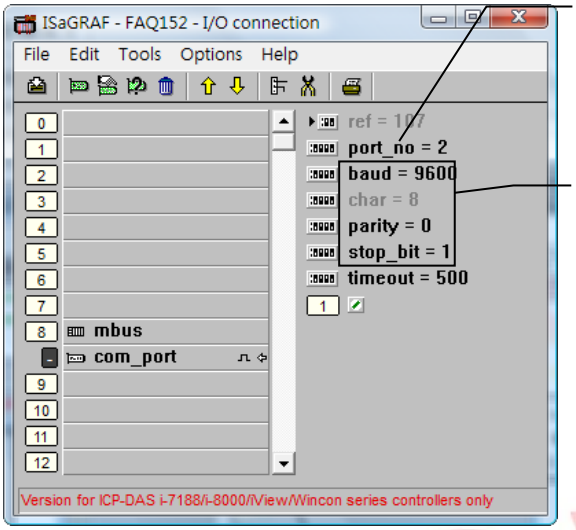
```
[DEBUG]
arrays=1
```

Save it, after editing, then re-open the ISaGRAF workbench, you will find there is one more "Dim" column in the ISaGRAF dictionary. The number entered can be 1 to 512.

For more detailed description about variable array, please refer to the following website https://www.icpdas.com/en/faq/index.php?kind=280#751 > FAQ-039.

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- **I/O connection**



Establish the wire connection between the RS-485 of IR module and the COM2 of the ISaGRAF PAC

Baud rate : 9600, Data bit : 8, Parity : None, Stop bit : 1

- **GetEvent Procedure Description :**

```
(* Scan the state of the buttons *)
for ii := 0    to 6 do

   (* If the state of button is true, then assign *)
   (* the specified value in the variables “command” and “channel” *)
   if Not(trigger_17) and button[ii] then

      command := ii + 1;
      channel := 1;

      (* Set the variable “trigger_17” as True”, *)
      (* for noticing the C-function block “Mbus_N_W” *)
      (* to send Modbus command to IR module. *)
      trigger_17 := true;

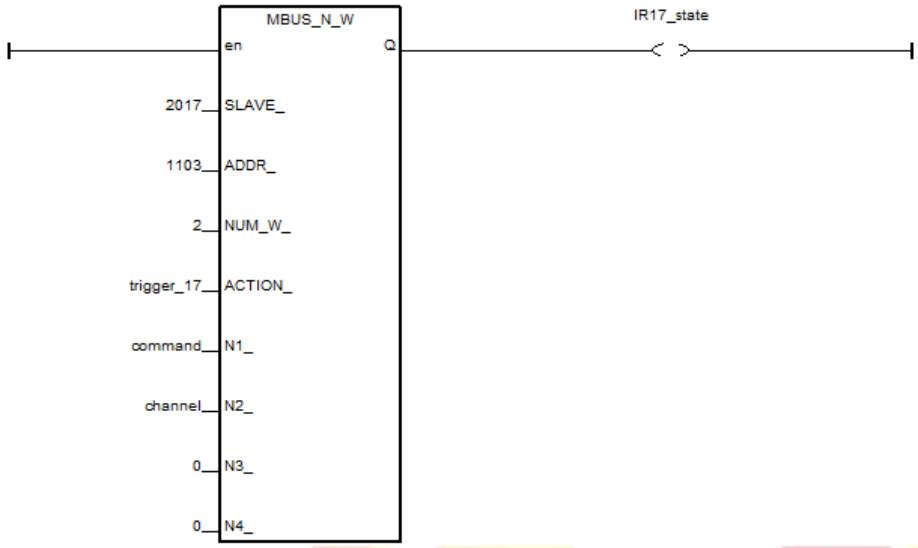
   end_if;

end_for;
```

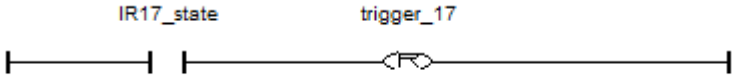

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- **IRCtrl Procedure Description :**

(* When the variable “trigger_17” is True, *)
(* the c-function block “MBUS_N_W” will send two integers： *)
(* command、channel , into the IR module *)
(* that the address is 1103 and 1104 and NetID is 17*)



(* When the sending Modbus command is successful, *)
(* set the variable “trigger_17” as false *)



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