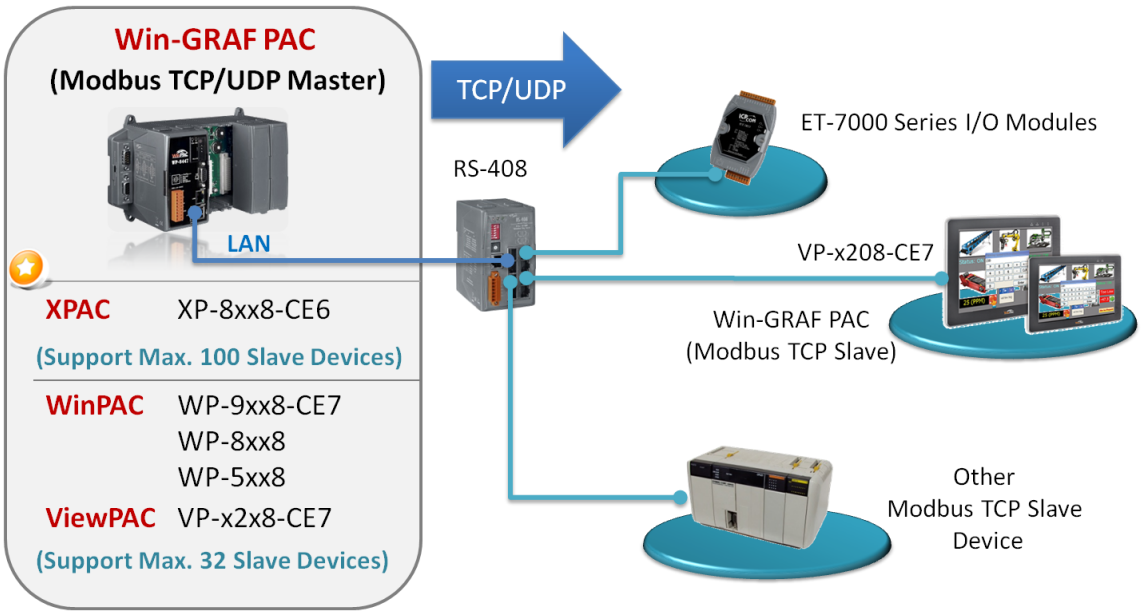
How to Enable the Win-GRAF PAC as the Modbus TCP/UDP Master to link ET-7000 I/O Modules?

Click the link for more Win-GRAF FAQ

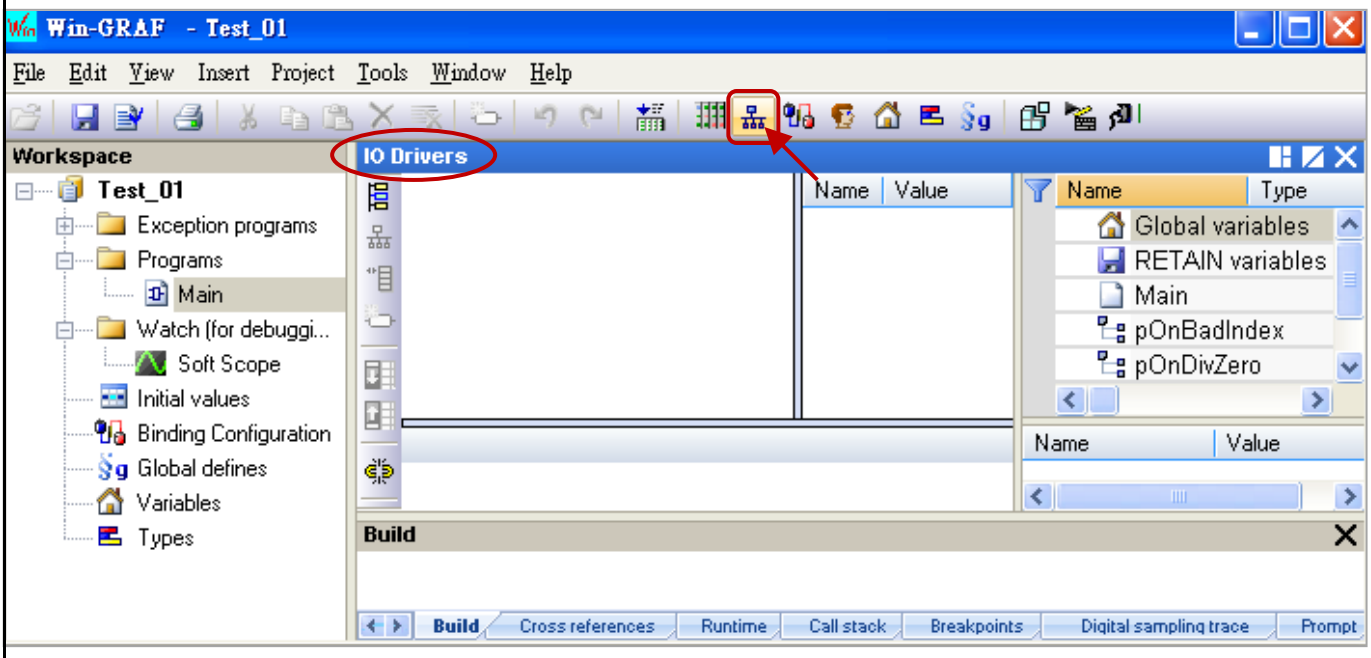
1.1. Enabling the Win-GRAF PAC as a Modbus TCP/UDP Master

Application Diagram:



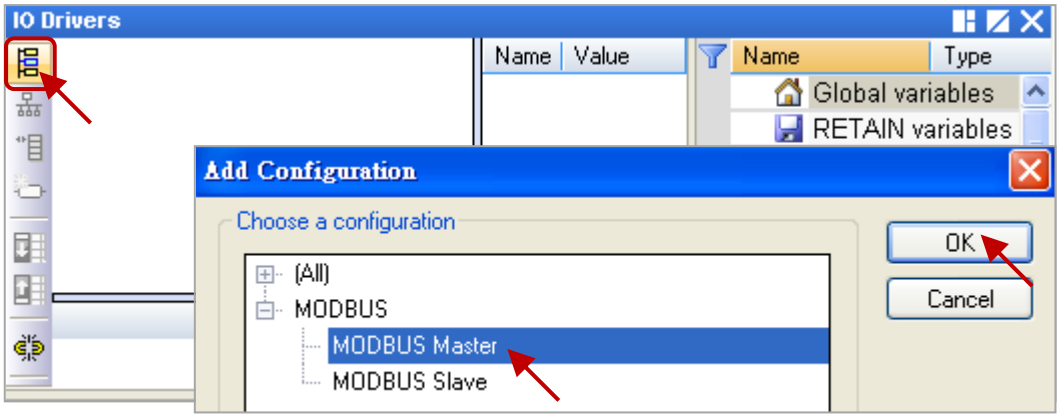
The Setting Steps:

1. Click the tool icon “Open Fieldbus Configuration” to open the “I/O Drivers” window.

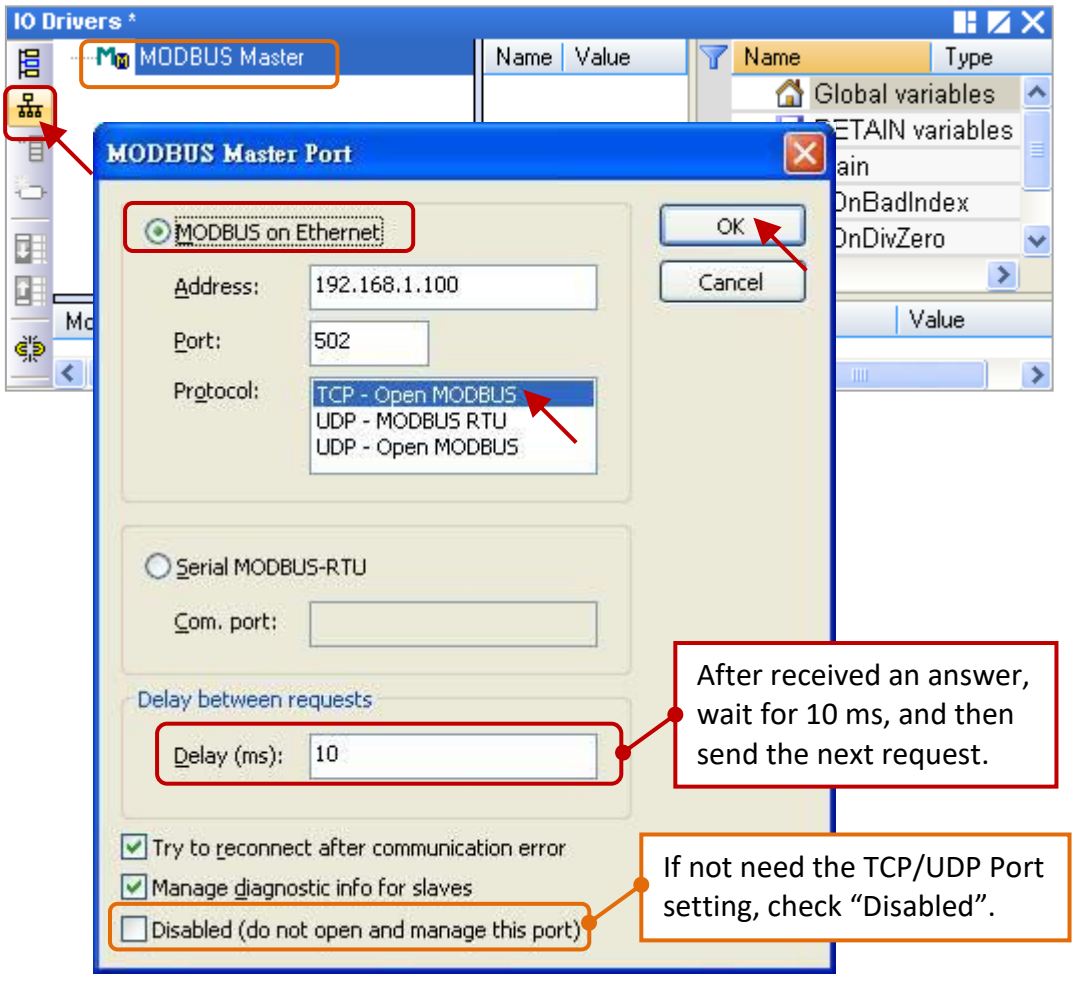


2. Click “Insert Configuration” icon in the left side of the “I/O Drivers” window, and then click “MODBUS Master”, then click “OK” to enable a Modbus Master.

   Note: One “Modbus Master” can set up multiple Ports (see the next step), can set as a Modbus Master RTU/ASCII Port or a Modbus Master TCP/UDP Port or can set up not to enable the setting.



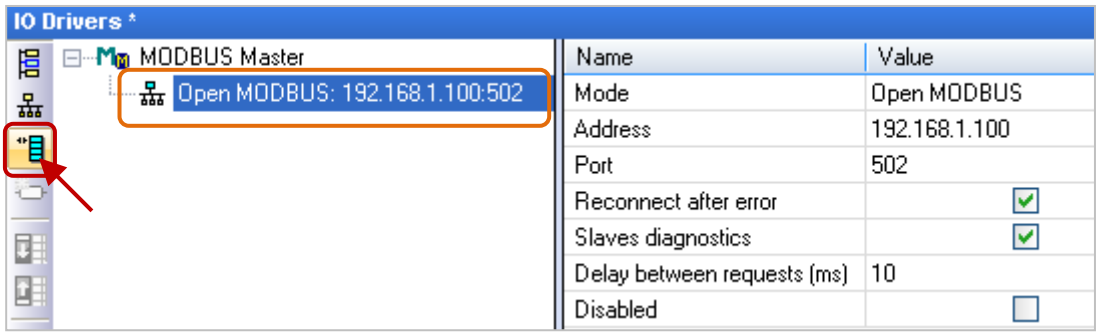
3. Click the tool icon “Insert Master/Port” in the left side and open the setting window. Then, select the “MODBUS on Ethernet” and set up the related items, and then click “OK”.



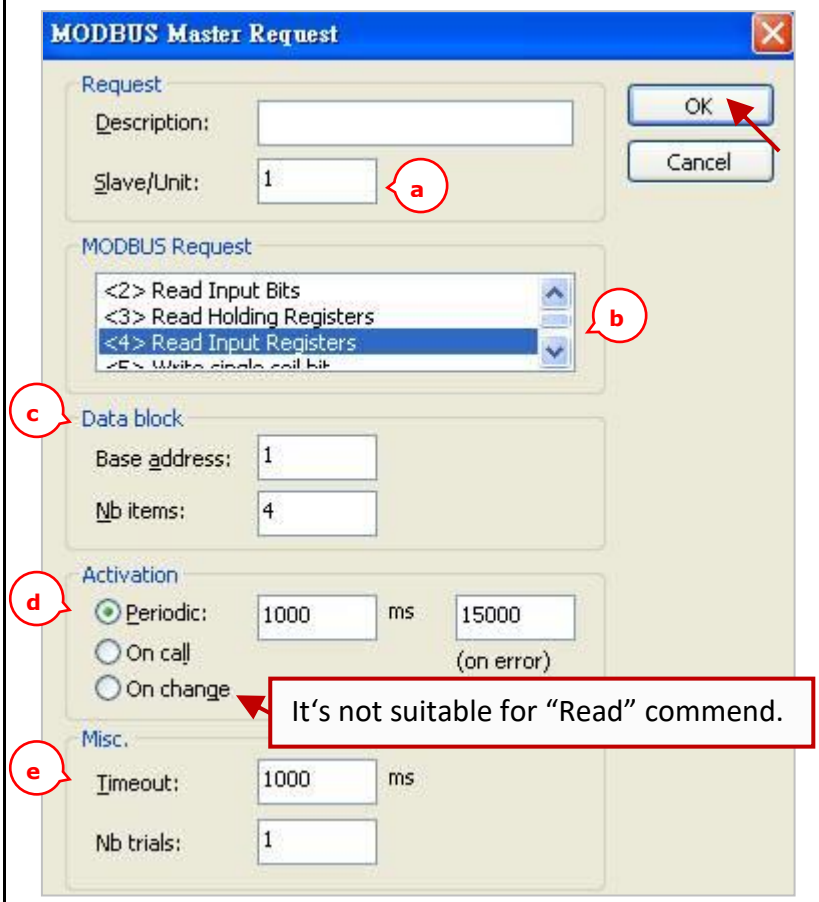
Address:	Fill in the IP Address of the Modbus Slave device (e.g., “192.168.1.100”).
Port:	TCP port Number of the Slave device.
Protocol:	If as a Modbus TCP Master, select the “TCP – Open MODBUS”.
	If as a Modbus UDP Master, choose the “UDP – Open MODBUS”.
Delay:	Fill in the delay time (e.g., 10 ms, can be 0 ~ 10000).

1.1.1. Read AI Data

1. Click the icon “Insert Slave/Data Block” in the left side to create a “Data Block”.



2. In the “MODBUS Master Request” setting window, set up the following items, and then click “OK".



In this example

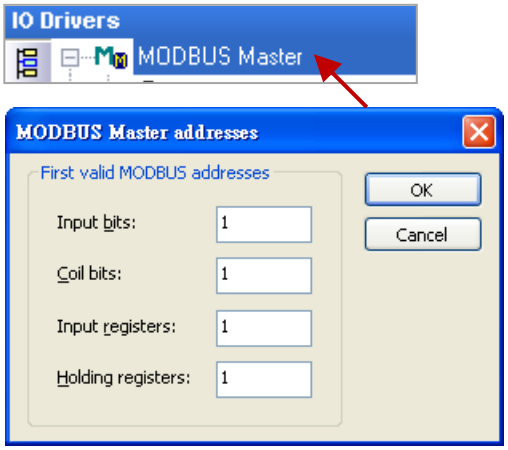
a. Slave/Unit:
Fill in the Net-ID of the Slave device (Usually is “1”).

b. MODBUS Request:
Select “<4> Read Input Registers”.

c. Base address:
Default to start from 1.
Nb items:
The AI numbers to read (here is 4).

Note:

If want to change the “Base address”, please use mouse to right-click the “MODBUS Master”, and then select “MODBUS Master Addresses” to change the value.



d. Activation: the sending way of Modbus Request.

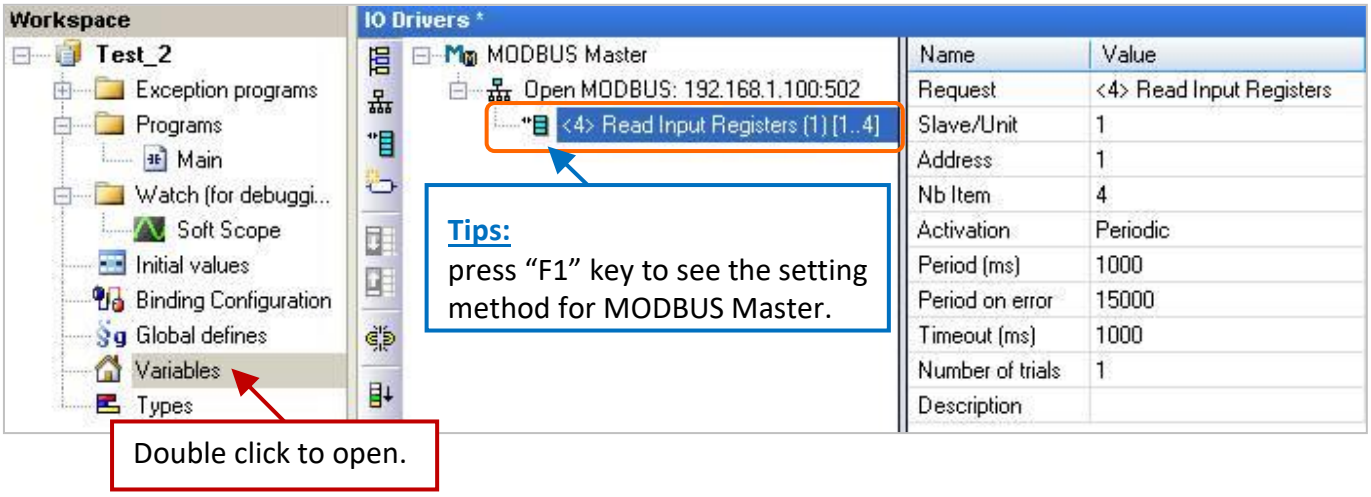
Periodic: Send request periodically. In this case, it sends request every 1 Sec. “on error” means that when an error occurs, the next sending time (in this case, 15 seconds).

On call: It will send the request once when a program calls it.

On change: It will send the request once when data is changed.

e. Timeout: Set up the max. time to wait for the response. If exceeds it, that means an error. (For Modbus TCP/UDP, recommended: 1000 ~ 3000 ms; this example is 1000 ms)

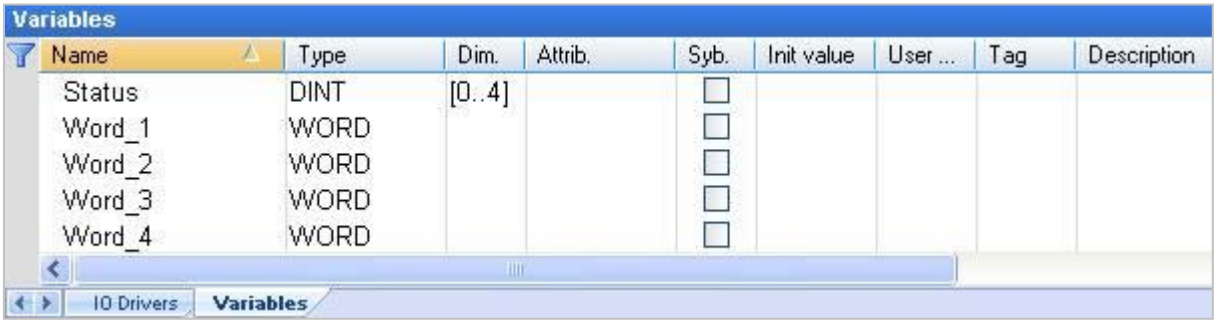
3. Open the “Variables” window, set up the variables want to use.



Please follow the table to set up 4 WORD (16 bit) variables.

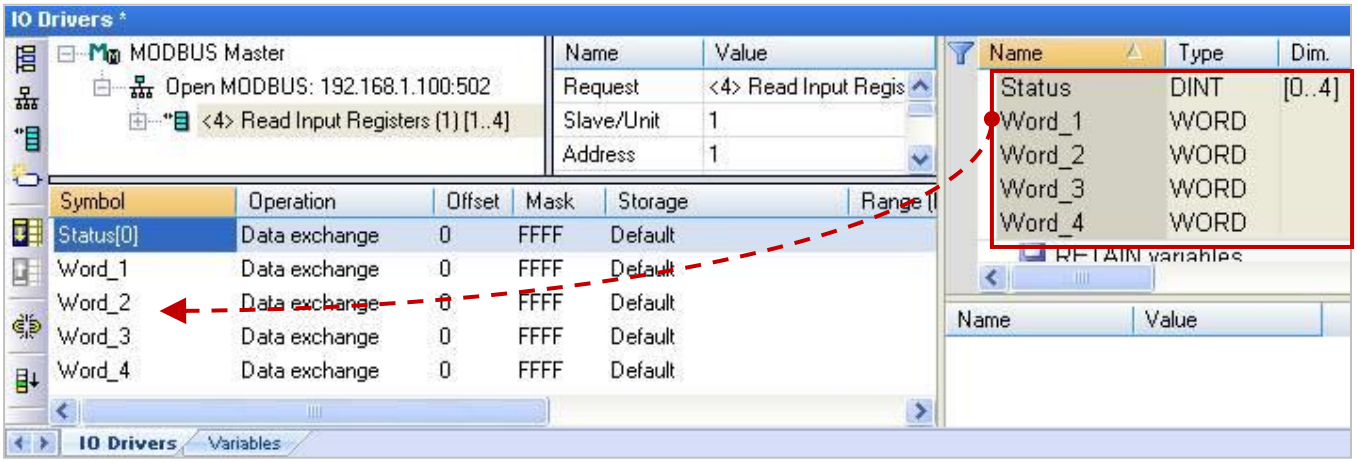
Variable Name	Data Type	Dim.	Description
Word_1 ~ Word_4	WORD	---	Used to read the AI data (16 bit)
Status	DINT	5	Used to record the read/write status

After setting up, it will show as the picture below (if not familiar with the method, refer the Win-GRAF Getting Started Manual - Section 2.3.1).



4. In the “I/O Drivers” window, drag the variables (“Word_1 ~ Word_4” and “Status”) from the Variables area to the “Symbol” area of the Data Block.

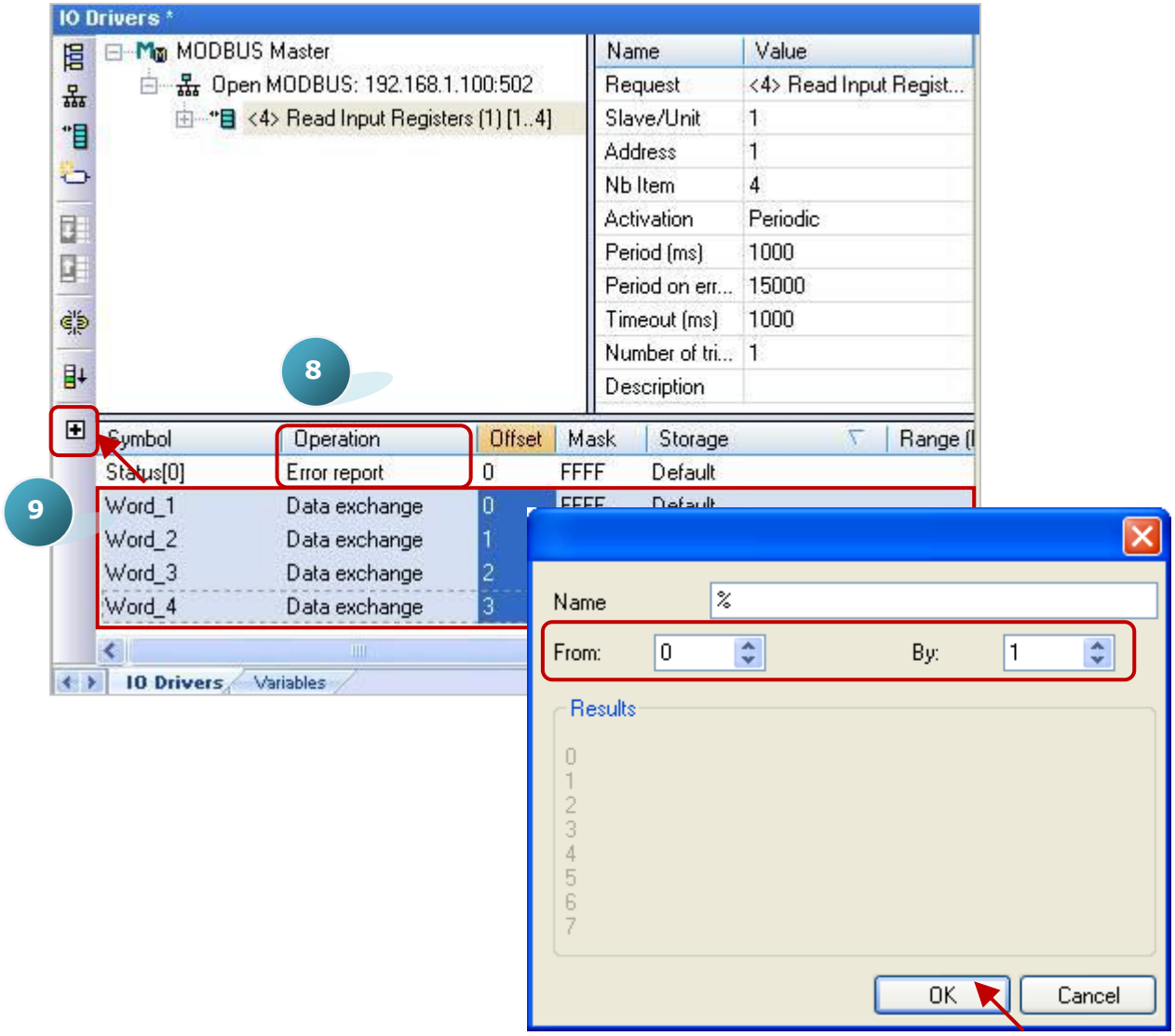
Notice: This example shows “Status” is an Array variable. When drag it to the “Symbol” area, it will become “Status[0] ~ Status[4]", please press “Delete” key to delete “Status[1] ~ [4]".



5. Set the “Operation” of the “Status[0]” to “Error report” (If reading data fails, its value is an “Error Code”; when reading data OK, it will reset to “0”.)

Note: Press the “F1” key to view the setting descriptions for the Modbus Master. In the title of “Status and command variables”, you can find the details about this commend and “Error Code”.

6. Select "Word_1 ~ Word_4" and click "Iterate property" to set up the "Offset" value (From: 0; By: 1).



Now, we have finished the setting to read AI data. In the following section, we will describe how to read/write the DI, DO, and AI data of the ET-7000 module. You can also refer the FAQ-009 to know the configure way to read/write the DI, DO, AI and AO data.

1.2. Connecting ET-7000 Series I/O Module

ICP DAS ET-7000 is a series of I/O module supporting Modbus TCP Slave protocol. The Win-GRAF PAC can enable the Modbus TCP Master to connect the ET-7000 modules. The maximum recommend the amount of the connecting ET-7000 modules depends on the PAC model, such as the XP-8xx8-CE6 and WP-5238-CE7, recommends a maximum of 200; the WP-8xx8, VP-22x8-CE7 and VP-42x8-CE7 is recommended that no more than 32.

For more information about the ET-7000 series products, please visit the website:
http://www.icpdas.com/en/product/guide+Remote__I_O__Module__and__Unit+Ethernet__I_O__Modules+ET-7000_ET-7200

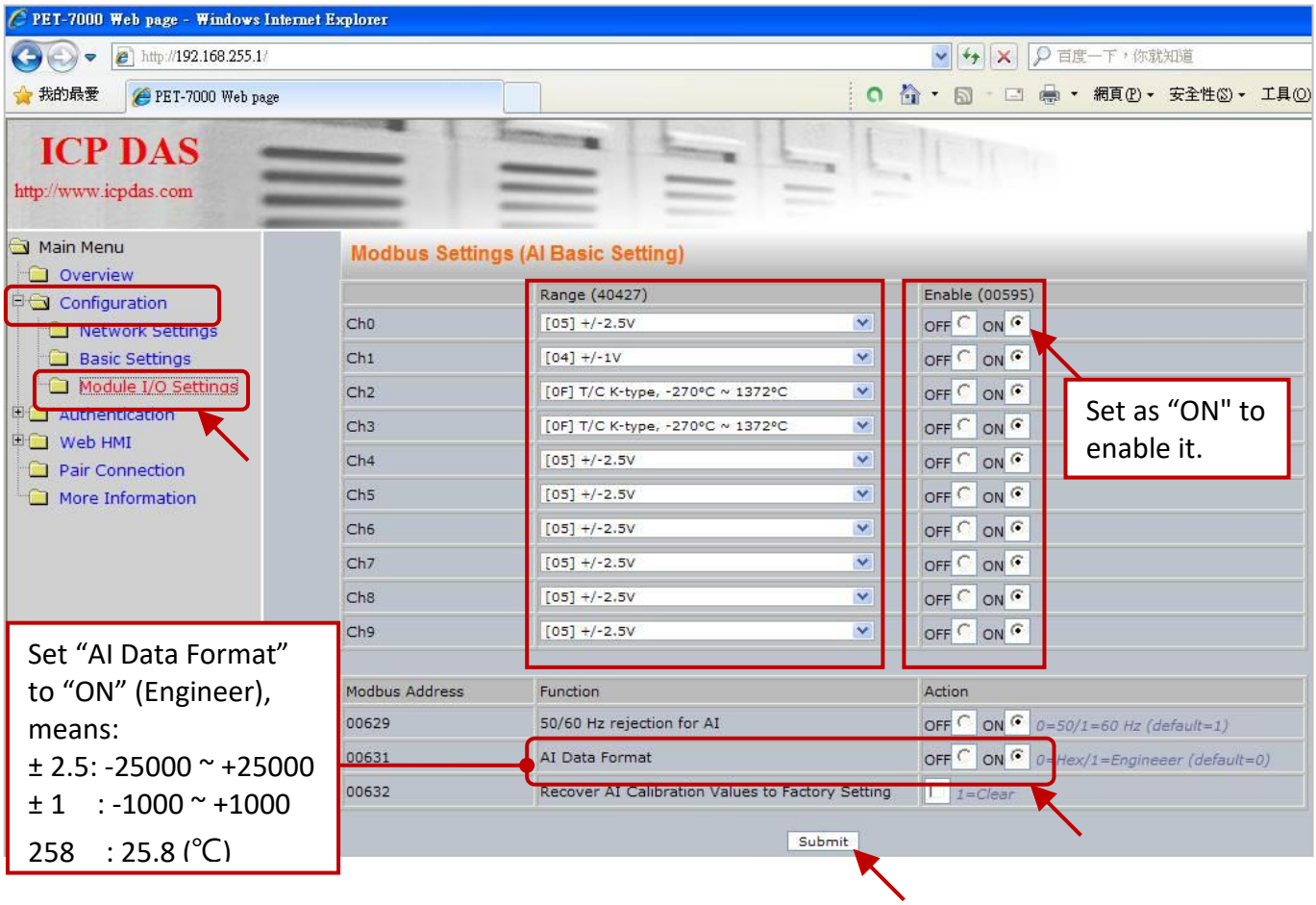
1.2.1. Use Internet Browser to Set the ET-7000 Modules

Before the first time using the ET-7000, you must set up the ET-7000 by using the Internet Browser. When the ET-7000 shipping from the factory, the settings are: IP address = 192.168.255.1; Mask = 255.255.0.0. Please set the IP of your PC in the same network (e.g., set the IP to 192.168.255.100, Mask = 255.255.0.0), then open the browser (such as IE), and enter the IP of the ET-7000 to connect it.

Notice: The Dip Switch on the rear of the ET-7000 must stay in the "Normal" position.

Username: Admin
Password: Admin
(Case sensitive)

Click “Configuration” > “Module I/O Settings” to set up the range of channels as below, and then click “Submit”.



Users can set the ET-7018Z‘s "AI Data Format" to "ON" (Engineering) for more convenient usage.
For example:

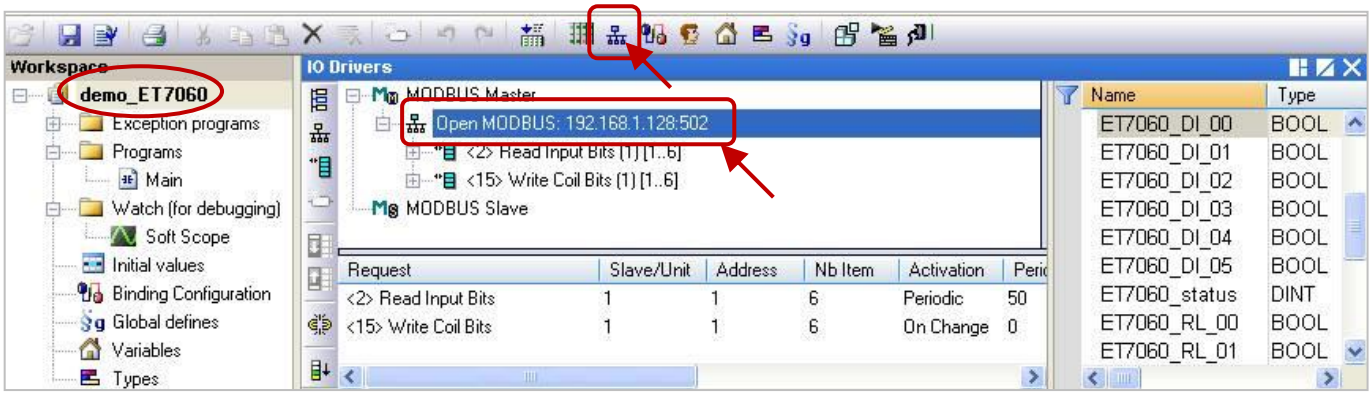
Type Code	Range	Data Format	Minimum	Maximum
04	-1 ~ +1 V	Engineering	-10000	+10000
		2’s comp HEX	8000h	7FFFh
05	-2.5 ~ +2.5 V	Engineering	-25000	+25000
		2’s comp HEX	8000h	7FFFh
18	Type M Thermocouple -200 ~ 100°C	Engineering	-20000	+10000
		2’s comp HEX	8000h	4000h

1.2.2. Restore/Open the Demo Project

This paper provides the following Win-GRAF demo projects, you can click the Win-GRAF menu bar "File" > "Add Existing Project" > "From Zip" to restore/open/check the demo projects.

Demo Project	File Name	Description
ET-7060	demo_ET7060.zip	Read 6 DIs, write 6 DOs
ET-7018Z	demo_ET7018z.zip	Read 10 AIs

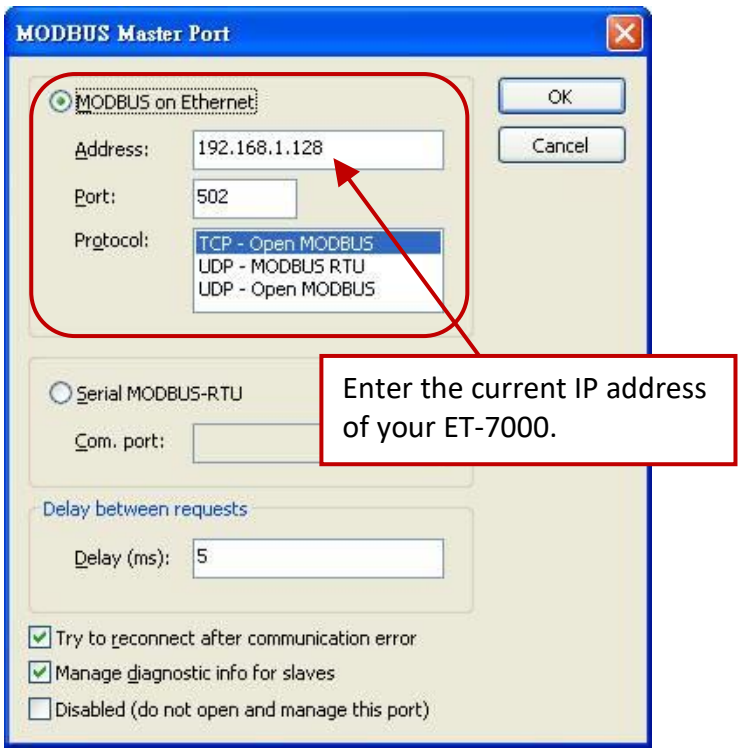
1. Click the tool icon “Open Fieldbus Configuration” to open the “I/O Drivers” window.



2. Double click “Open Modbus: IP:502” to open the “MODBUS Master Port” window.

Notice:

All demo projects in this chapter can enable the Win-GRAF PAC as a Modbus **TCP** Master. Fill in the current IP address of your ET-7000, and set "Port" to "502” and "Protocol" to "TCP - Open Modbus".



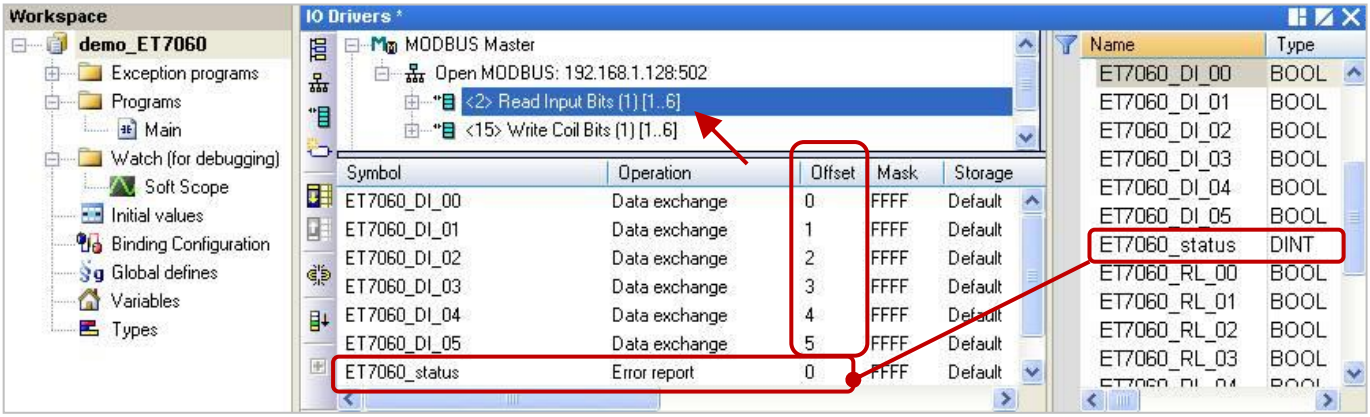
1.2.3. Connecting the ET-7060 (6 DI, 6 Relay)

The ET-7060 is a 6 DI and 6 Relay channels Ethernet I/O module. The Win-GRAF demo project for this section is "demo_ET7060.zip". Please refer Section 1.2.1 to set up the module channels using the Internet Browser, and restore/open the demo project.

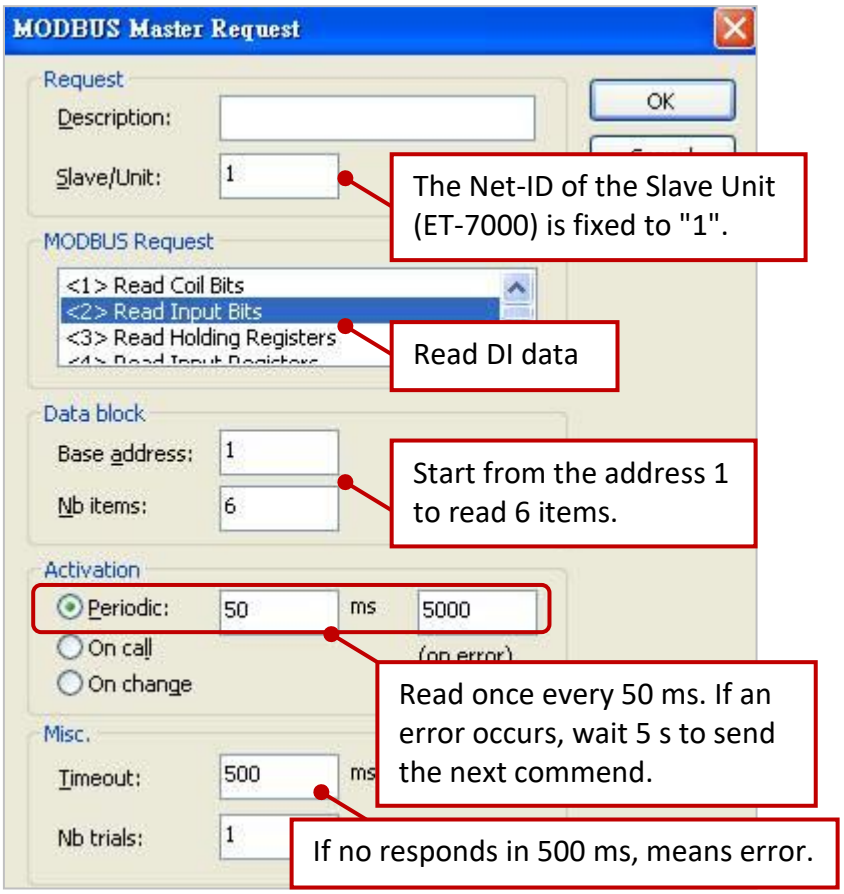
Demo Description:

This demo creates two Data Blocks, one is used to read 6 DI data, the other is used to write 6 DO data.

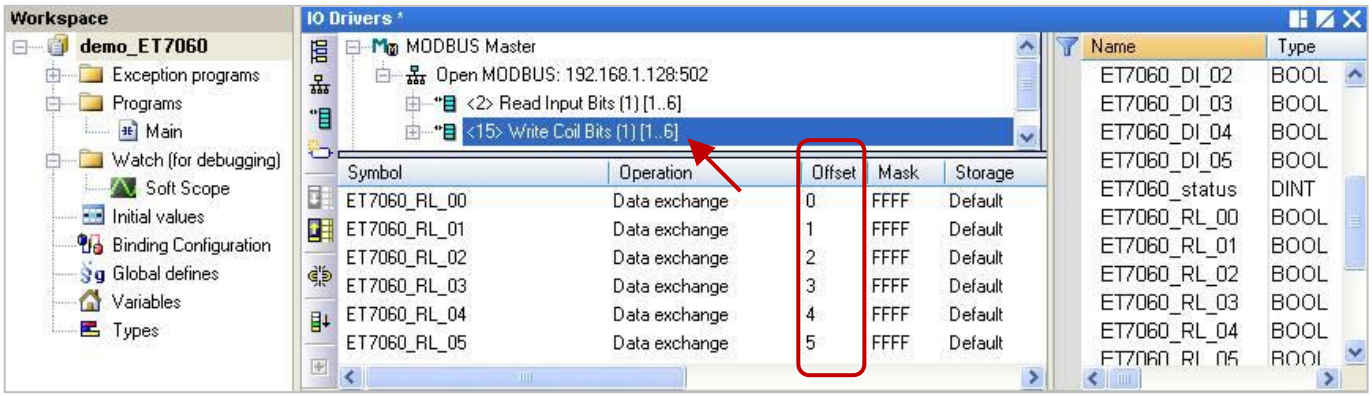
1. Double click the first Data Block (<2> Read Input Bits) to open the setting.

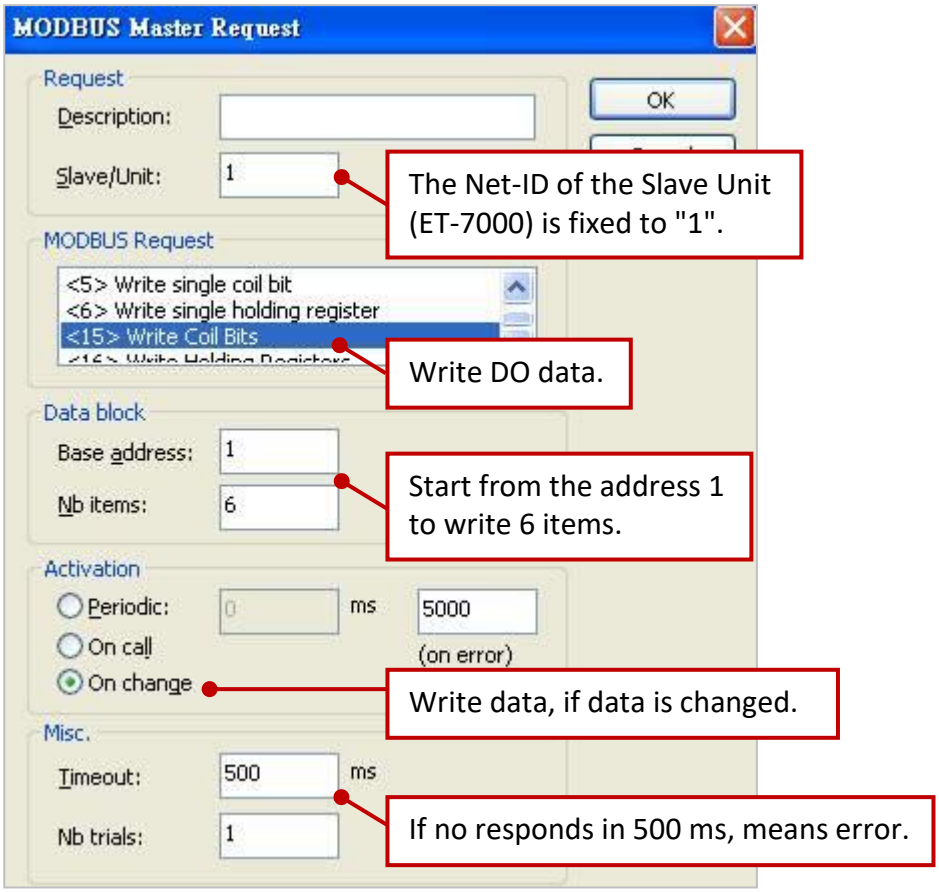


Note: (See the figure above)
The “Offset” value starts at “0” and the Modbus address of variable is equal to the “Offset” value plus 1 (Base address). Moreover, if you set the “Operation” as "**Error report**”, the “Offset” value for the mapping variable (Date Type: DINT) must set to “**0**”.



2. Double click the second Data Block (<15> Write Coil Bits) to open the setting window.





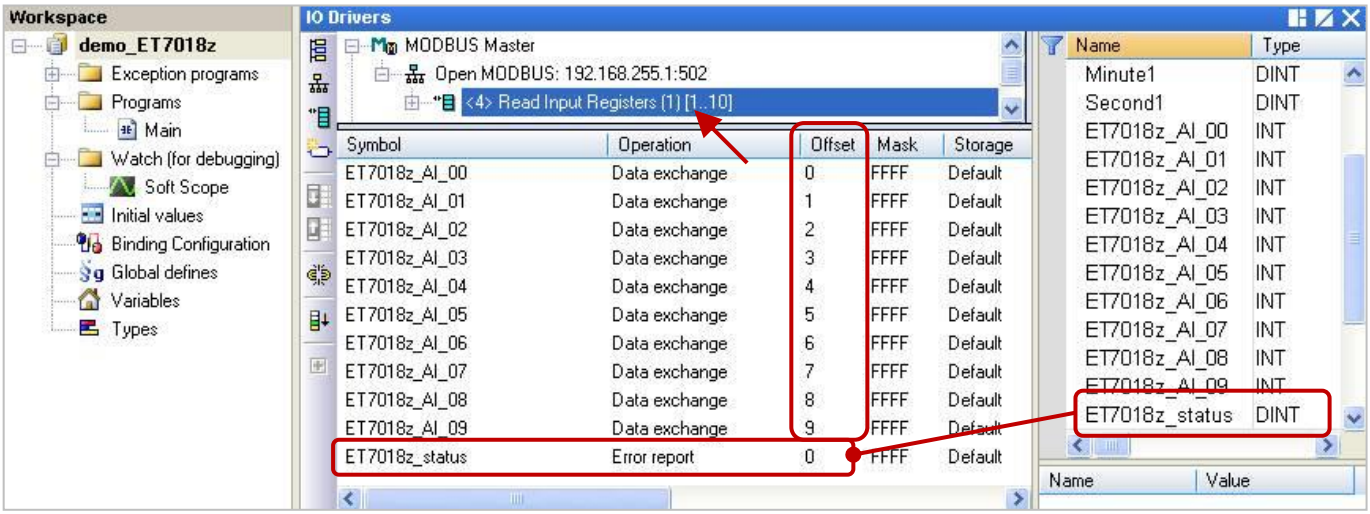
1.2.4. Connecting the ET-7018Z (10 AI)

The ET-7018Z is an 10 AI channels Ethernet I/O module. The Win-GRAF demo project for this section is "demo_ ET7018z.zip". Please refer Section 1.2.1 to set up the module channels using the Internet Browser, and restore/open the demo project.

Demo Description:

This demo creates one Data Block to read 10 AI data.

1. Double click the first Data Block (<4> Read Input Registers) to open the setting window.



Note: (See the figure above)

1. The “Offset” value starts at “0” and the Modbus address of variable is equal to the “Offset” value plus 1 (Base address).
2. If you set the “Operation” as "**Error report**”, the “Offset” value for the mapping variable (Date Type: DINT) must set to “**0**”.
3. If AI range is -32768 ~ 32767, please declare the data type as "INT" for the variable.