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How to Ena to link ET-7	ble th 000 I/	e Win-GRA O Modules	AF PAC a ;?	as the N	Lick the line	CP/UDP	Master
Application Diag	Vin-GRAI ous TCP/U Vin-GRAI ous TCP/U VP-8x XP-8x Max. 100 C WP-9: WP-5: AC VP-x2 Max. 32 S	F PAC DP Master) R x8-CE6 Slave Devices) xx8-CE7 xx8 xx8 xx8 xx8 xx8 xx8 xx8 xx8 xx8 xx	TCP/UDP RS-408	Wir (Mode	ET-7000 Ser VP-x208-CE ous TCP Slave)	ies I/O Module	S
1. Click the tool	 icon "Op :t_01	en Fieldbus Conf	iguration"	to open the	e "I/O Drivers"	window.	<u> </u>
<u>File Eait v</u> iew Insei	rt Project	<u>Iools window H</u> elp	) All + 21 1 1			الح ∞	
Workspace Test_01 Test_01 Test_01 Constraints Main Main Main Watch (for Soft So Soft So Soft So Soft So Soft So Soft So Soft So Soft So Soft So Thitial value Soft So Soft So Thitial value Soft So Soft Soft Soft Soft So Soft	brograms debuggi cope is nfiguration nes	IO Drivers	references F	Runtime Call st	e Value	Name Name RETA Main C: pOnE C: pOnD	I variables
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- 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".

ivers *		
MODBUS Master	Name	Type
		ai variables 🗠
MODBUS Master Port	ain	
MODBUS on Ethernet         Address:       192.168.1.100         Bort:       502         Protocol:       TCP - Open MODBUS UDP - MODBUS RTU UDP - Open MODBUS	OK DnE Cancel	BadIndex DivZero
O <u>S</u> erial MODBUS-RTU Com. port:		
Delay between requests	After received	d an answer,
Delay (ms): 10	send the next	s, and then request.
Try to reconnect after communication error	If not nood the	
Manage diagnostic info for slaves	setting check "	Disabled"
Disabled (do not open and manage this port)	setting, theth I	

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Address Port: Protoco Delay:	s: Fill in the IP A TCP port Num ol: If as a Modbu If as a Modbu Fill in the dela	ddress of Iber of the s TCP Mas s UDP Ma Iy time (e.	the Modbus Sla Slave device. Ster, select the ster, choose th g., 10 ms, can b	ave devic "TCP – O e "UDP – pe 0 ~ 10	e (e.g., "192.: pen MODBUS - Open MODB 000).	168.1.100"). 5". US".		

# 1.1.1. Read AI Data

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

101	)rivers *		
E	□M <sub>B</sub> MODBUS Master	Name	Value
묘	- <mark>- 뀲</mark> Open MODBUS: 192.168.1.100:502	Mode	Open MODBUS
*		Address	192.168.1.100
		Port	502
	$\mathbf{N}$	Reconnect after error	<b>~</b>
		Slaves diagnostics	<b>~</b>
		Delay between requests (ms)	10
		Disabled	

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

MODBUS Master Request	
Request     OK       Description:     Cancel	In this example
Slave/Unit:  A  A  MODBUS Request  C  C  C  C  C  C  C  C  C  C  C  C  C	<ul> <li>a. <u>Slave/Unit</u>: Fill in the Net-ID of the Slave device (Usually is "1").</li> <li>b. <u>MODBUS Request</u>: Select "&lt;4&gt; Read Input Registers".</li> </ul>
Base address:       1         Nb items:       4         Activation         OPeriodic:       1000         MS       15000	<ul> <li>c. <u>Base address</u>:</li> <li>Default to start from 1.</li> <li><u>Nb items</u>:</li> <li>The All sumbars to read (here is 4)</li> </ul>
On call (on error) On change It's not suitable for "Read" commend.	The Al humbers to read (here is 4).
Nb trials:	
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### 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.
 <u>Periodic</u>: 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.

IO Drivers	US Master 🙀	
MODBUS Master add	resses	
First valid MODBUS a	ddresses	ОК
Input <u>b</u> its:	1	Cancel
<u>⊂</u> oil bits:	1	
Input <u>r</u> egisters:	1	
Holding registers:	1	

- e. <u>Timeout</u>: 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.

Workspace	IO Drivers *		
⊡ 🗊 Test_2	E ⊟-Mo MODBUS Master	Name	Value
🗄 — 🥅 Exception programs	🚊 🗄 🚠 Open MODBUS: 192.168.1.100:502	Request	<4> Read Input Registers
🖨 🔤 Programs	**** <4> Read Input Registers (1) [14]	Slave/Unit	1
🛄 🎟 Main		Address	1
🗄 📴 Watch (for debuggi		Nb Item	4
Soft Scope	H Tips:	Activation	Periodic
📰 Initial values	press "F1" key to see the setting	Period (ms)	1000
	method for MODBUS Master.	Period on error	15000
🔤 😽 🚽 🚽 🚽	¢þ	Timeout (ms)	1000
🚮 Variables 🦕		Number of trials	1
E Types	<b>H</b> +	Description	

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

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After setting u	ıp, it will	show as th	e pictu	ire below (	if not fam	iliar with	the me	thod, r	efer the <u>W</u>	in-GRA
<u>Getting Starte</u>	<u>d Manua</u>	l - Section	2.3.1).							
Variables										
<b>Name</b>	4	Туре	Dim.	Attrib.	Syb.	Init value	User	Tag	Description	
Status		DINT	[04	j,						
Word 2		WORD								
Word 3		WORD								
Word_4		WORD								
<										
	rs Variat	bles								
4. In the "I/O D	rivers" w	indow, dra	g the v	ariables ("	Word_1~	Word_4	" and "S	status"	) from the	
Variables are	a to the '	'Symbol" a	rea of	the Data B	lock.					
Notice: This ex	ample sh	nows "Stati	us" is a	n Array va	riable. Wh	ien drag	it to the	"Symb	ol" area, it	will
becom	e "Status	s[0] ~ Statu	ıs[4]" <i>,</i> p	please pres	ss "Delete	" key to	delete "	Status[	1] ~ [4]".	
10 Drivers *	Martin			Marrie	Makin				Ture	Disc
	Master MODBUS: 1	92 168 1 100 5	in2	Name	<4> Read In	oput Begis 🗸	Y Nam	ie atus		10 /1
	4> Read Inpu	ut Registers (1)	[14]	Slave/Unit	1	ipachogis	•w	ord 1	WORD	[04]
"8				Address	1	*	e 🖌 w	ord_2	WORD	
Symbol	Operation	n 01	ifset Ma	sk Storage		Range	a w	ord_3	WORD	
Status[0]	Data exch	nange O	FFF	F Default			1 W	ord_4	WORD	
Word_1	Data excł	nange O	FFF	F <u>Default</u>			<		IN variables	
Word_2	Data excl	hange	FFF	F Default			Name		Value	
Word_3	Data exch	hange U hange Ω	FFF	F Default F Default						
II+ ₩010_+	Data chci	lange o		Deraduk		3	a			
( ) IO Drivers	/ariables			H.			211			
		C.1	[a]# .	<i>"_</i>				•	"_	
5. Set the "Ope	ration" o	the "Stati	us[0]" t	o "Error re	eport" (If r	eading c	lata fails	, its va	lue is an "E	rror
Code"; when	reading	data OK, it	will re	set to "0".)						
Note: Press t	he "F1" k	key to view	the se	tting descr	riptions fo	r the Mo	dbus M	aster. I	n the title o	of
"Statu	s and con	, nmand var	iables"	. vou can f	ind the de	tails abc	out this d	comme	nd and "Er	ror
Code"				,,,						
COUE .										

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6. Select "Word\_1 ~ Word\_4" and click "Iterate property" to set up the "Offset" value (From: 0; By: 1).

	È - ₩ Ope	n MODBUS: 192.168.1.1 <4> Read Input Register:	100:502 s (1) [14]	Red	nuest	(A) Dood I	I Denia		
	֥	<4> Read Input Register:	s (1) [14]	01		<4> Read Input Regist			
				Sia	ve/Unit	1			
					dress	1			
01 01 01					ltem	4			
2 6'5				Act	ivation	Periodic			
è's				Per	iod (ms)	1000			
CD.				Per	iod on err	15000			
212				Tim	eout (ms)	1000			
EL.		8		Nur	mber of tri	1			
				Des	scription				
Đ	Symbol	Operation	Offset M	1ask	Storage		∑   Range (I		
	Status[0]	Error report	O FF	FF	Default		20		
	Word_1	Data exchange		FE	Default				
	Word_2	Data exchange	1						
	Word_3	Data exchange	2		e/				
	Word_4	Data exchange	3 Na	me	%				
	<		Fro	m:	0	\$	By:	1	\$
<u> </u>	I U UIIVEIS a	vanaues //	0 1 2 3 4 5 6 7	lesults					
			7						

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.

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# 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\_Modu les+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.

# **<u>Notice</u>**: The Dip Switch on the rear of the ET-7000 must stay in the "Normal" position.

	PET-7000 Web pa	ge - Windows Internet Ex	plorer	
Username: Admin Password: Admin (Case sensitive)	速線到 192.168.2          位於 PET-70182 自         反密碼。         警告:此伺服器要:         式傳送 (基本驗證)         使用者名稱①):         密碼④):	255.1 的伺服器 192.168.255.1 需要( 求您的使用者名稱及密碼以 ,不含安全連線)。	<ul> <li>2 ×</li> <li>使用者名稱</li> <li>不安全的方</li> <li>▼</li> <li>▼</li> <li>取消</li> </ul>	

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lick "Configuratior Submit".	ז" > "Module I/	O Settin	gs" to set up the	range	of cha	nnels as	below	, and then click		
PET-7000 Web page - Windo	ws Internet Explorer									
🔆 🕞 🗢 🖻 http://192.168.25	55.1/					v (+) ()	くり目れ	度一下,你就知道		
🚖 我的最爱 🏾 🌈 PET-7000 Wei	b page				0	🟠 • 📾 •	- 🖶 -	網頁(₽) → 安全性(S) → エ		
http://www.icpdas.com	Modbus	s Settings (/	Al Basic Setting)							
			Range (40427)			Enable (00	595)			
Network Settings	Ch0		[05] +/-2.5V		~	OFF ON	C			
Basic Settings	Ch1		[04] +/-1V		~		·			
Module I/O Settings	Ch2		[0F] T/C K-type, -270°C ~	1372°C	~		•			
Authentication	Ch3		[0F] T/C K-type, -270°C ~	1372°C	~		0	Set as "ON" to		
Pair Connection	Ch4		[05] +/-2.5V		~		•	enable it.		
More Information	Ch5		[05] +/-2.5V		~		•			
	Ch6		[05] +/-2.5V		~	OFF C ON	•			
	Ch7		[05] +/-2.5V		~		•			
	Ch8		[05] +/-2.5V		*	OFF ON	•			
Set "Al Data Form	nat"		[05] +/-2.5V		~	OFF ON	•			
to "ON" (Enginee	r) Modbus Ad	Idress	Function			Action				
means:	00629		50/60 Hz rejection for AI				· 0=50/	(1=60 Hz (default=1)		
+ 2 5· - 25000 ~ ±'	25000 00631		AI Data Format				• 0=He	x/1=Engineeer (default=0)		
$\pm 2.5. \pm 25000 \pm 1$	000		Recover AI Calibration Val	ues to Facto	ry Setting	1 1=Clei	ar:			
$\pm 1$ 1000 +1	.000			Sub	mit		~	•		
258 : 25.8 (°C)				1						

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	1~11/	Engineering	-10000	+10000	
04	-1 * +1 V	2's comp HEX	8000h	7FFFh	
05	2 5 ~ + 2 5 1/	Engineering	-25000	+25000	
05	-2.5 <sup>v</sup> +2.5 V	2's comp HEX	8000h	7FFFh	
	Type M	Engineering	-20000	+10000	
18	Thermocouple -200 ~ 100°C	2's comp HEX	8000h	4000h	

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### **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 Als

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

CIB B 6 X 13 B	Xalalaelt	7 III & <b>Va </b>	6 E :	ig 🕑 🍗	ا 🕄 🚔										
Workspace	IO Drivers							HZ							
		B I Mo MODBUS Master													
🗄 📃 Exception programs	고 📴 🚠 Open MODB	US: 192.168.1.128:50	2				ET7060_D1_00	BOOL	~						
🛓 🔤 Programs	*** (2> Read														
🛄 🔢 Main	🗎 👘 📲 <15> Wri	"■													
🚊 🔁 Watch (for debugging)	MODBUS Slave						ET7060_DI_03	BOOL							
Soft Scope	<b>H</b> B						ET7060 DI 04	BOOL							
📰 Initial values	Request	Slave/Unit	Address	Nb Item	Activation	Peric	ET7060_DI_05	BOOL							
🚽 🚮 Binding Configuration	<2> Read Input Bits	1	1	6	Periodic	50	ET7060_status	DINT							
Šg Global defines	<15> Write Coil Bits	1	1	6	On Change	0	ET7060_RL_00	BOOL							
🚮 Variables					Procession (2017)	718910	ET7060_RL_01	BOOL	~						
E Types	<b>∃</b> + <					>	<	>							

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".

MODBUS on Ethernet     Address: 192.168.1     Port: 502     Prgtocol: TCP - Ope     UDP - MOD     UDP - Ope	128 MODBUS BUS RTU n MODBUS	
◯ <u>S</u> erial MODBUS-RTU <u>C</u> om. port:	Enter the current IP addr of your ET-7000.	ress
Delay between requests <u>D</u> elay (ms): 5		
<ul> <li>✓ Try to reconnect after comm</li> <li>✓ Manage diagnostic info for s</li> <li>Disabled (do not open and m</li> </ul>	nunication error Ilaves nanage this port)	

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### 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 <u>Section 1.2.1</u> 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 "O" 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**".



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

Workspace	10 Drivers *						
		5 Master			^	7 Name	Туре
😐 🚞 Exception programs	표 in La Oper	MODBUS: 192.168.1.12	8:502			ET7060_DI_02	BOOL 🔺
🖶 🔤 Programs	*******	2> Read Input Bits (1) [1.	.6]			ET7060_DI_03	BOOL
🛄 🏦 Main	.∎ 	15> Write Coil Bits (1) [1	6]	_	~	ET7060_DI_04	BOOL
🚊 🖓 🔤 Watch (for debugging)	Sumbol	Opera	tion 0	ffeat Maek	Storage	ET7060_DI_05	BOOL
Soft Scope		Data e	wchange 0	FFFF	Default	ET7060_status	DINT
📰 Initial values	ET7060 BL 01	Data e	xchange 1	FFFF	Default	ET7060_RL_00	BOOL
Binding Configuration	ET7060 BL 02	Data e	xchange 2	FFFF	Default	ET7060_RL_01	BOOL
g Global defines	ET7060 RL 03	Data e	xchange 3	FFFF	Default	ET7060_RL_02	BOOL
Variables	ET7060_RL_04	Data e	xchange 4	FFFF	Default	ET7060_RL_03	BOOL
- Types	ET7060_RL_05	Data e	xchange 5	FFFF	Default	ET7060_RL_04	BOOL
	<b>*</b> <				>		ВСЛОЛ 🗳
	MODBUS Maste         Request         Description:         Slave/Unit:         MODBUS Reque         <5> Write sir         <6> Write sir         <15> Write (         >12< Write (         Data block         Base address:	r Request	The Net-ID (ET-7000) Write DO	) of the S is fixed t data.	Glave Unit		
	Nb items:	6	to write 6	items.			
	O Periodic:	0 ms	5000				
	O On call						
	O On change		(on error)				
	on thange	•	Write data	a, if data	is change	ed.	
	Misc.		L				
	Timeout:	500 ms					
	Nb trials:	1	If no respo	onds in 5	00 ms, m	eans error.	
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# 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 <u>Section 1.2.1</u> 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)

- 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.



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