LP-2648M

User Manual

Ver. 1 (2026)

Contents

Chapter 1 — Software Installation & Hardware Setup 3

1.1 Install Win-GRAF software 3
1.2 Configure Win-GRAF PAC IP address 7
1.3 How to write / download Win-GRAF programs 9
1.4 Compile and download programs 15

Chapter 2 — Common Settings & Tools 18

2.1 LP-2648M Web Management Interface Login and Description 19
2.2 Setting the LP-2648M IP Address / Mask / Gateway 21
2.3 Configure LP-2648M System Date and Time 22
2.4 Querying/ Update the Win-GRAF Version 25
2.5 OPC UA Server Certificate 29
Certificate Management Pages: 29
Regenerate Self-Signed Certificate > Function Description 33
2.6 How to Set the ICP DAS Remote Module ID 39
2.7 How to Find the LP-2648M IP Address 42
2.8 Deleting the Win-GRAF Program on the LP-2648M 43
2.9 Changing the LP-2648M Login Password 46

Chapter 3 — Using C Programs to Read/Write Win-GRAF Variables 47

3.1 Making Win-GRAF Variables Available for C Programs 48
3.2 Downloading and Compiling Custom C Programs 52

Appendix A. LP-2648M Hardware Specifications 58

Appendix B. References 60

Chapter 1 — Software Installation & Hardware Setup

1.1 Install Win-GRAF software

Before installing Win-GRAF, please confirm the PC environment meets the requirements.

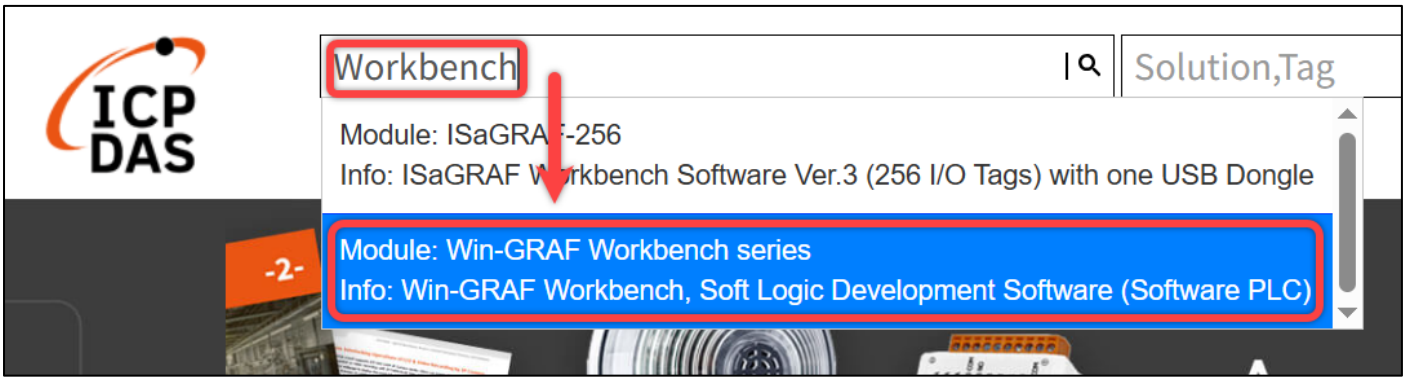
System requirements:

- **OS:** Windows 10 (32-bit or 64-bit) or Windows 11 and above
- **Microsoft .Net Framework 3.5** (download from Microsoft: https://www.microsoft.com/en-us/download/details.aspx?id=22)
- **RAM:** minimum 1 GB (recommended 2 GB)
- **Free disk space:** at least 200 MB

Installation steps:

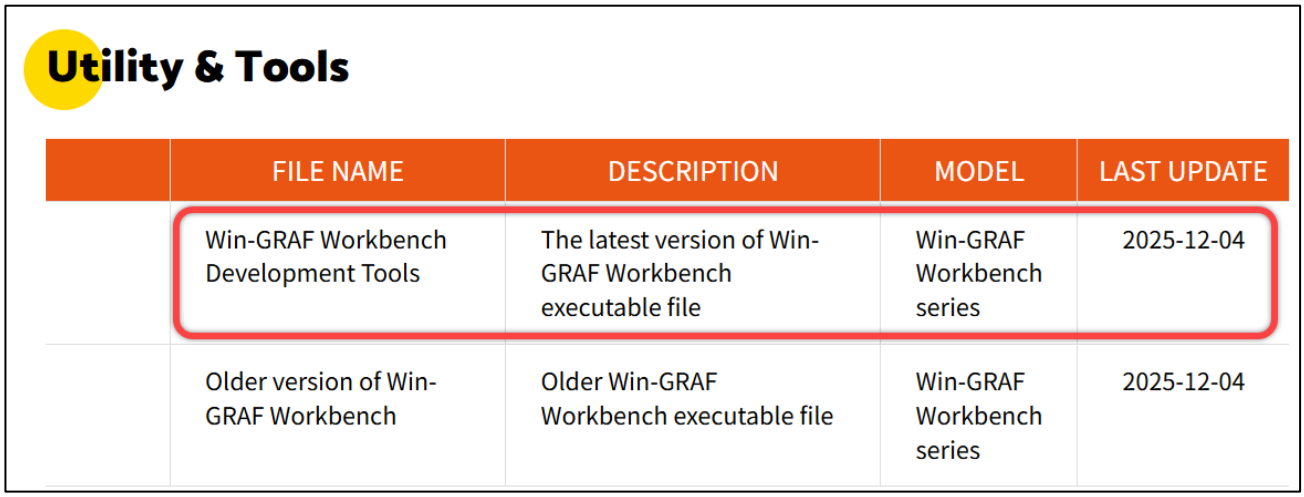
◎ Download Win-GRAF Workbench from ICP DAS website (https://www.icpdas.com)◎

a) Search “Workbench” → Click “Win-GRAF Workbench series”



b) In the top-right of page, click “Download Center.”

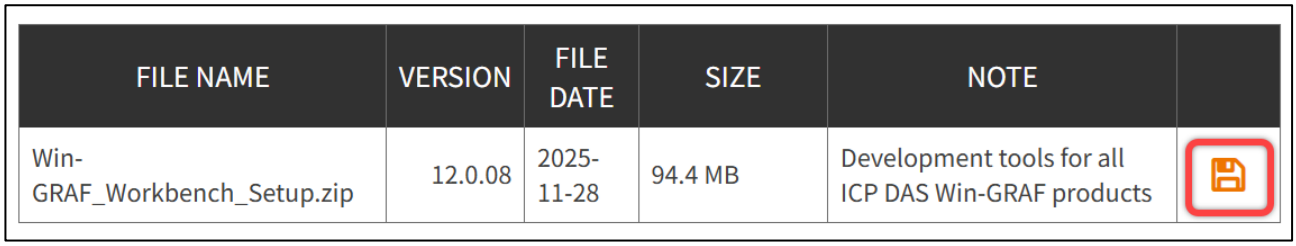
c) Scroll down to the “Utility & Tools” section, click “Win-GRAF Workbench Development Tools.”



Utility & Tools

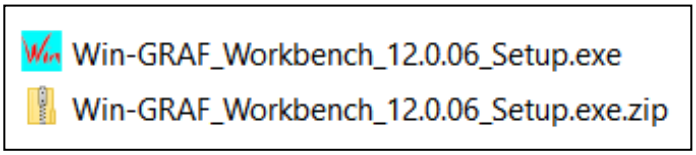
	FILE NAME	DESCRIPTION	MODEL	LAST UPDATE
	Win-GRAF Workbench Development Tools	The latest version of Win-GRAF Workbench executable file	Win-GRAF Workbench series	2025-12-04
	Older version of Win-GRAF Workbench	Older Win-GRAF Workbench executable file	Win-GRAF Workbench series	2025-12-04

d) Click the file icon at the end of the row labeled “Win-GRAF_Workbench_Setup.zip” to download the executable file.

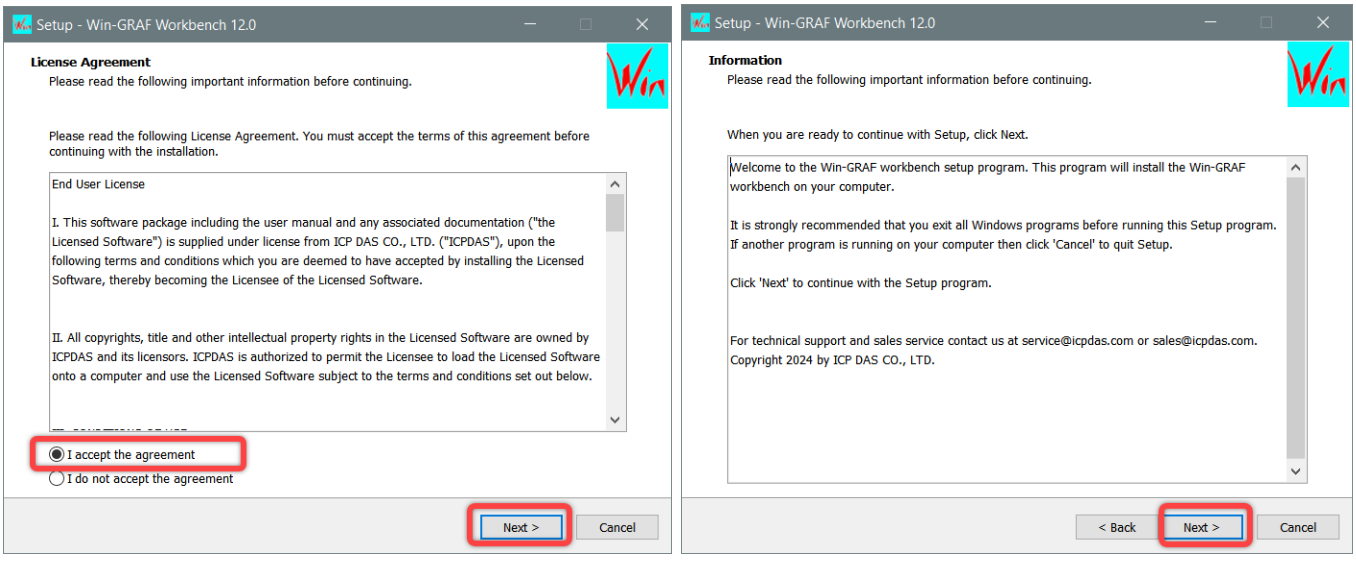


FILE NAME	VERSION	FILE DATE	SIZE	NOTE	
Win-GRAF_Workbench_Setup.zip	12.0.08	2025-11-28	94.4 MB	Development tools for all ICP DAS Win-GRAF products	

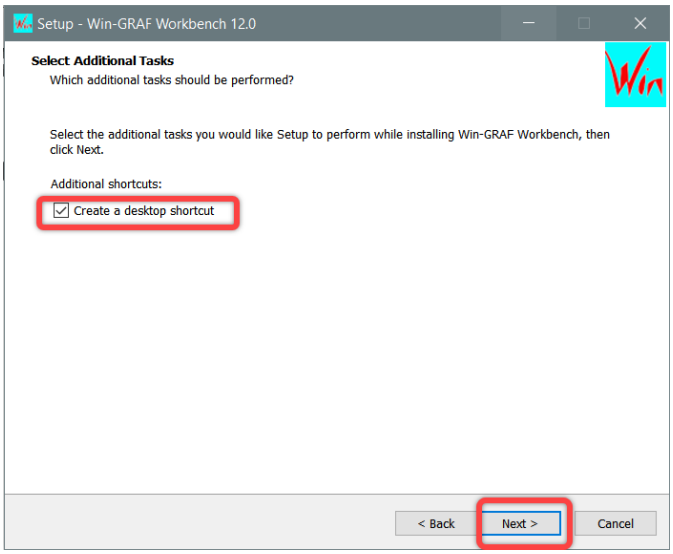
e) After the download is complete, double-click the compressed file, extract its contents, and follow the installation wizard to complete the setup.

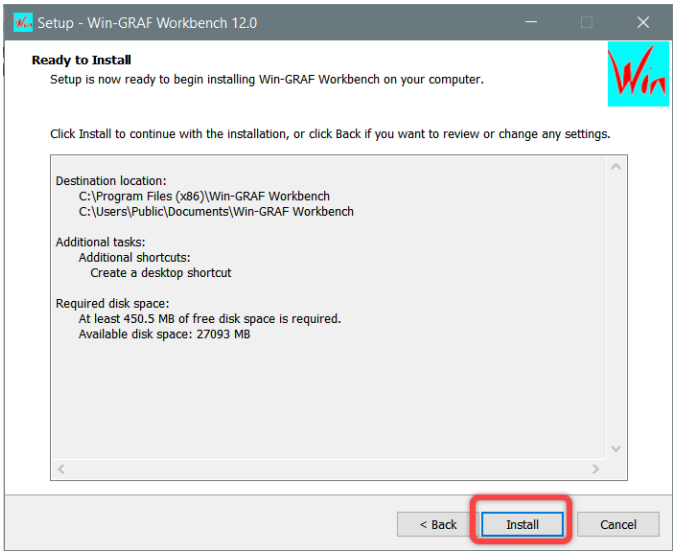


f) Select “I Accept the License Agreement” and click “Next.” An information dialog box will appear; please read it and click “Next.”

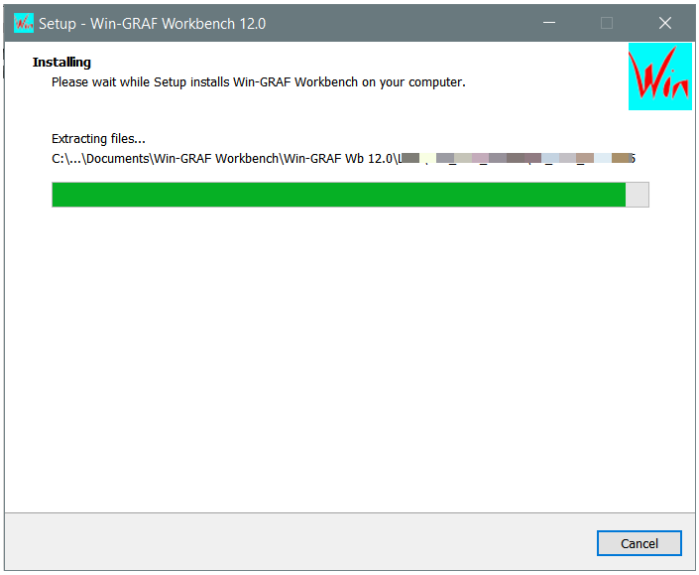


g) You may check “Create a desktop shortcut” to create a desktop shortcut, then click “Next” to proceed. Click “Install” to begin installing the Win-GRAF software.

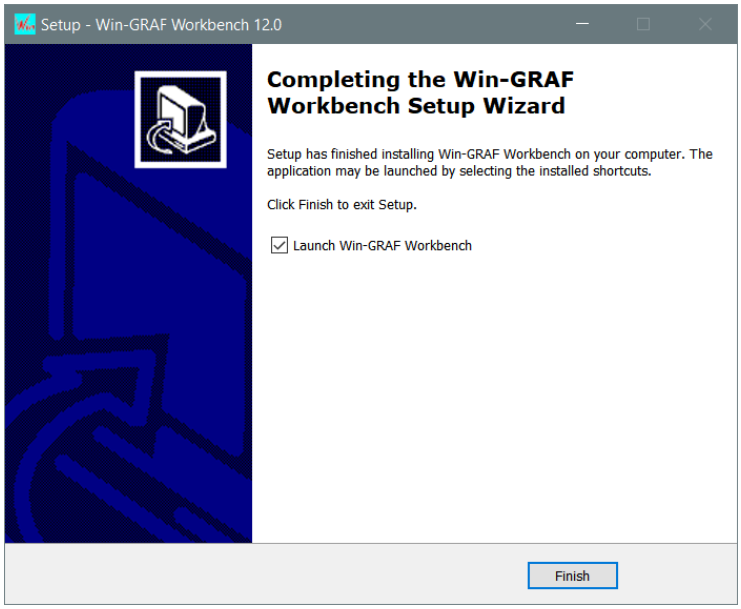




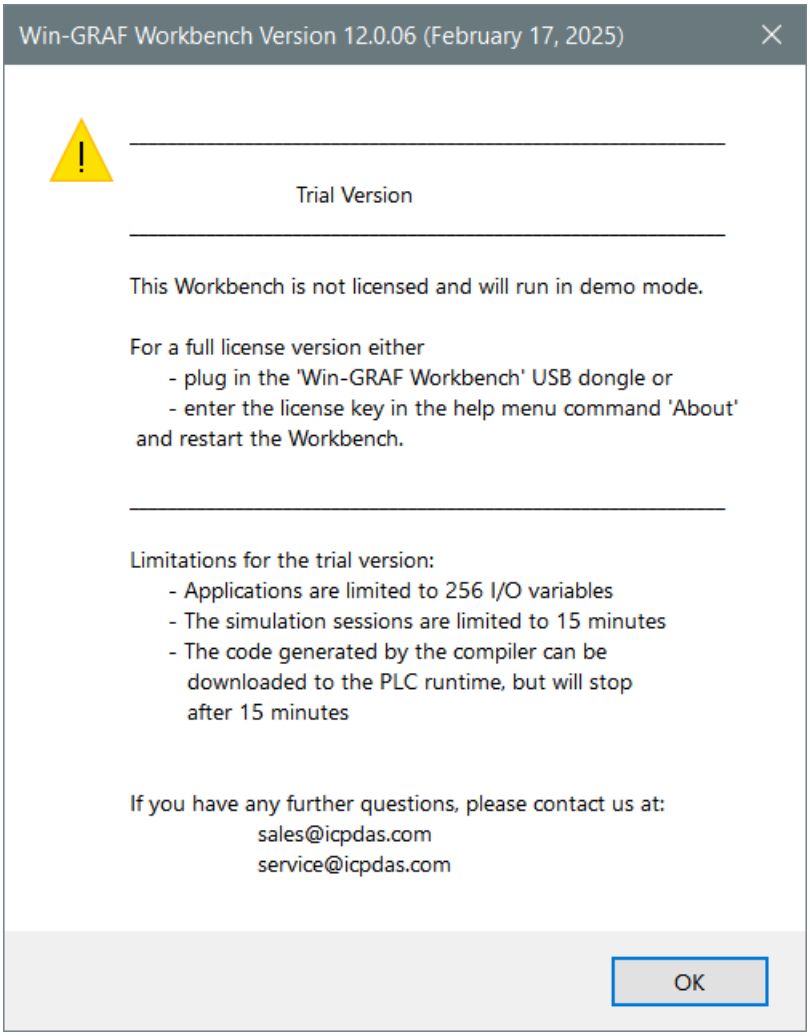
h) Wait for the installation to complete.



i) The installation is complete. The option below is selected by default; click “Finish” to launch Win-GRAF Workbench immediately.



j) After the installation is complete, the Workbench software will launch automatically. The first screen you will see is the Trial Version screen shown below:



The trial version has limitations:

- Only 256 I/O variables available.
- Stops after 15 minutes; requires restart.
- Compiled code downloaded to runtime runs only 15 minutes.

❖ To obtain a **full license**, follow the online license application instructions on ICP DAS website. (https://www.icpdas.com/en/product/guide+Software+Development__Tools+Win-GRAF#2632)

1.2 Configure Win-GRAF PAC IP address

This section explains how to connect Win-GRAF Workbench (after licensing) to the LP-2648M and configure network settings.

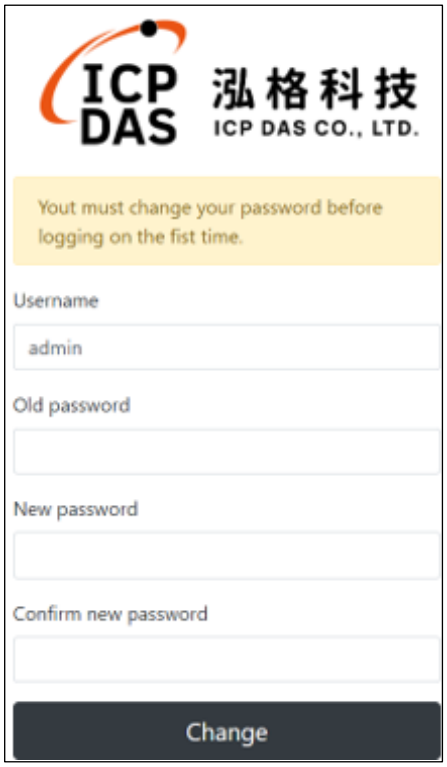
- **Default LP-2648M IP:** 192.168.255.1
- After receiving the device, change its IP to match your network (example used: 192.168.83.30).

IP Changing Steps:

a) Open a browser and go to http://192.168.255.1

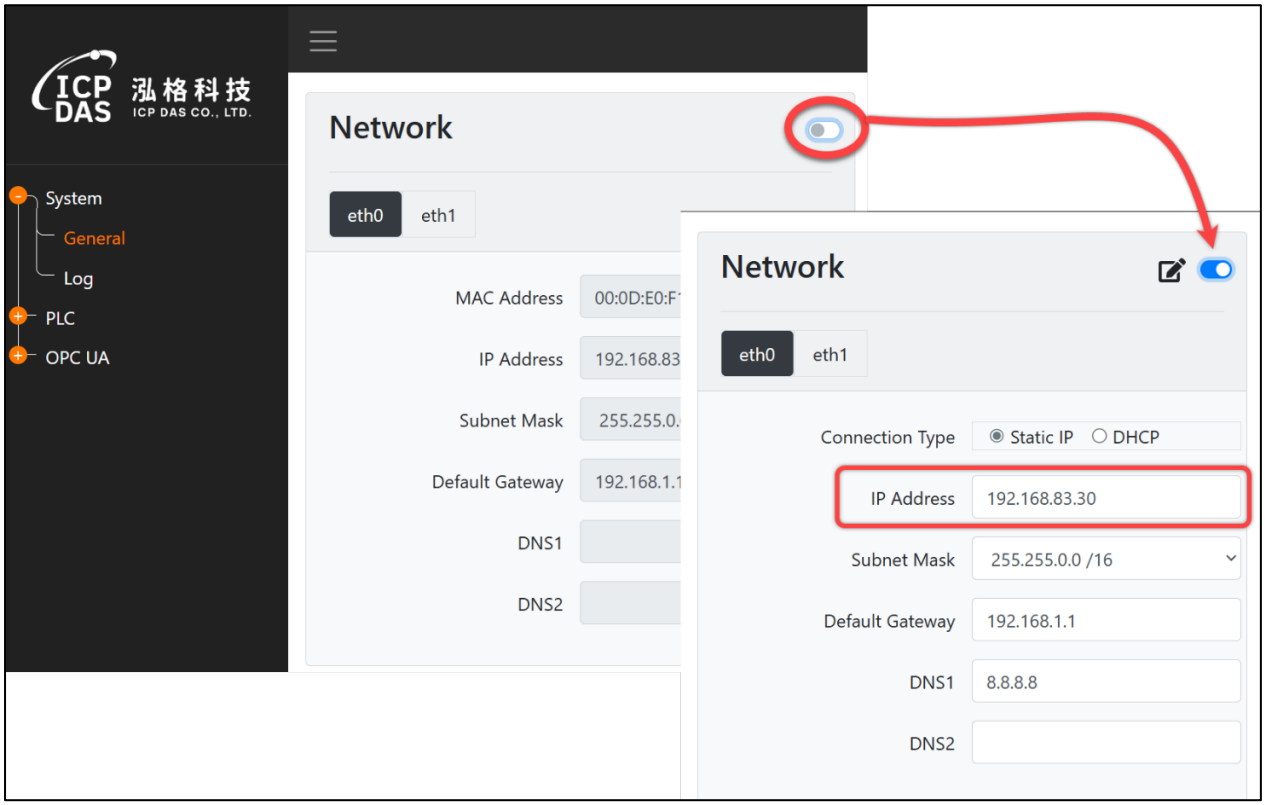
b) Login with default credentials: **admin / admin**.

c) On first login the system will require you to change the username/password—enter new credentials and click “Change” to save.



※ The system does not provide a retrieval function; please keep your username and password secure. ※

d) After logging in, the default interface shown below will appear. Click the switch circled in red; once enabled, you can enter the current device address and related network configuration settings.

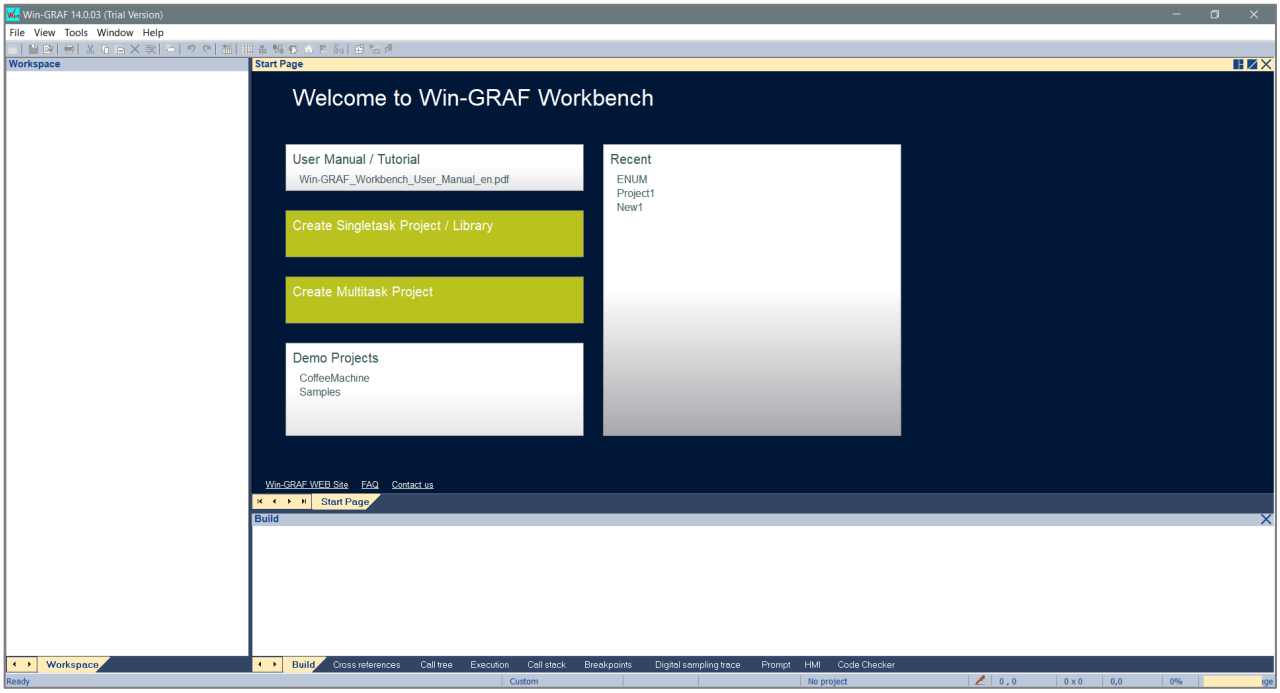


e) After entering the information, click again to turn it off and complete the device IP configuration.

1.3 How to write / download Win-GRAF programs

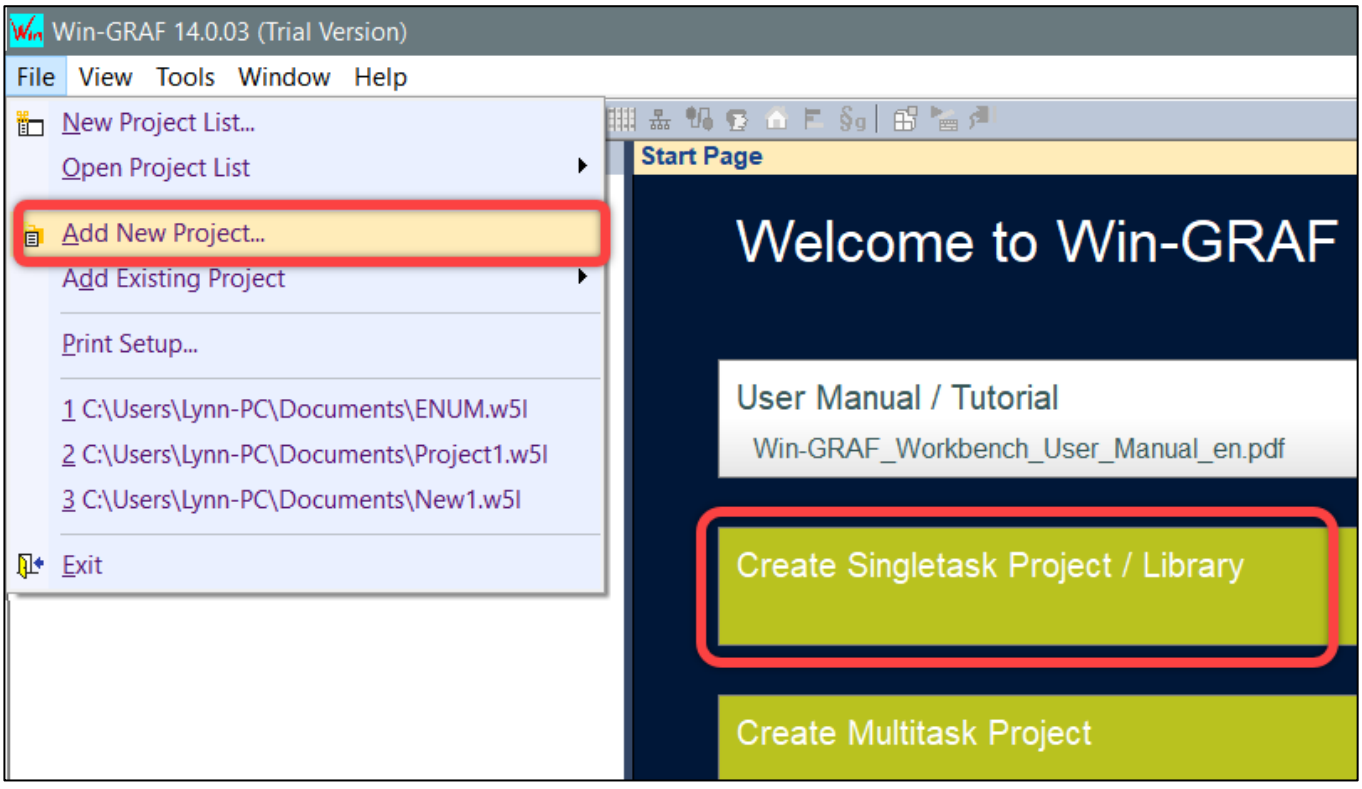
Win-GRAF Workbench supports IEC-61131 languages and provides separate editors for each. This section shows how to create a project, declare PLC variables, and download the compiled program to the LP-2648M.

Create a project

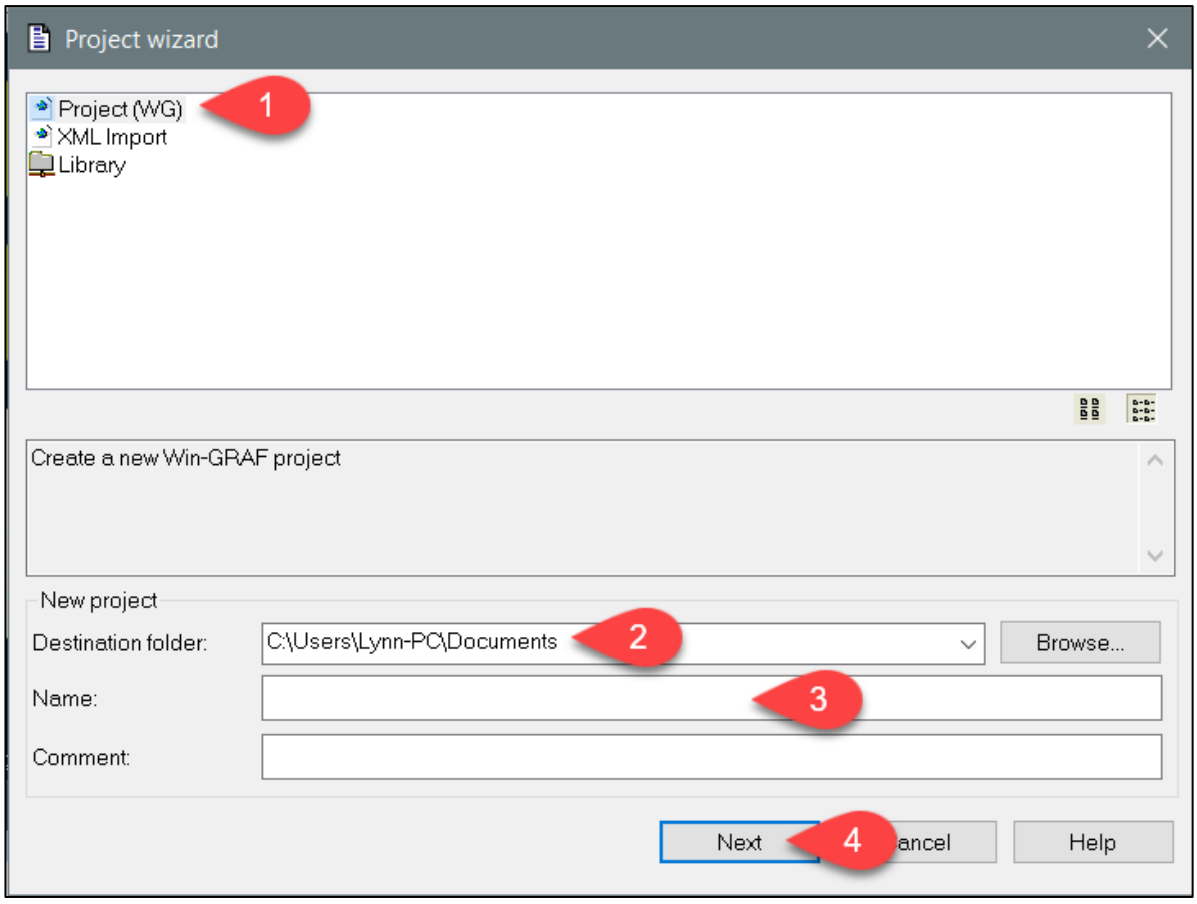


Steps:

a) Launch **Win-GRAF Workbench**. On the **Start Page** choose **New single-task project** (or File → Add new project).



b) Select **Project (WG)**, choose a destination folder, enter a project name, and click **Next**. (Tip: use a dedicated empty folder for each project.)

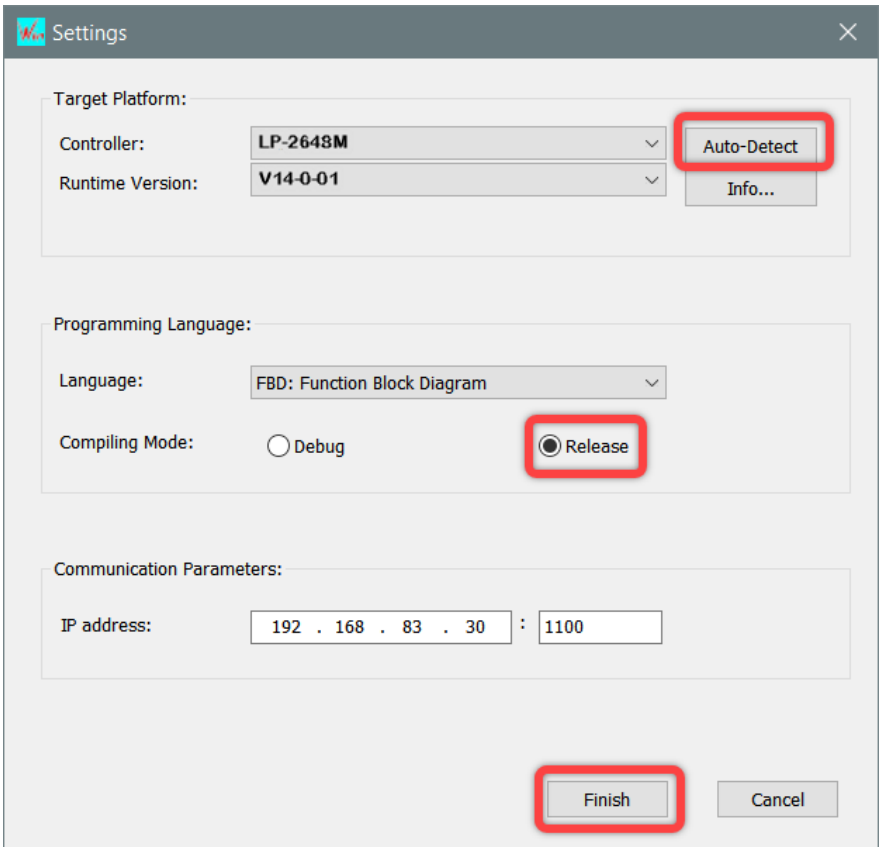


Note: It is recommended to create a dedicated new folder for the project or use an empty folder, which will make it easier to manage and maintain the files and documents generated by the project later.

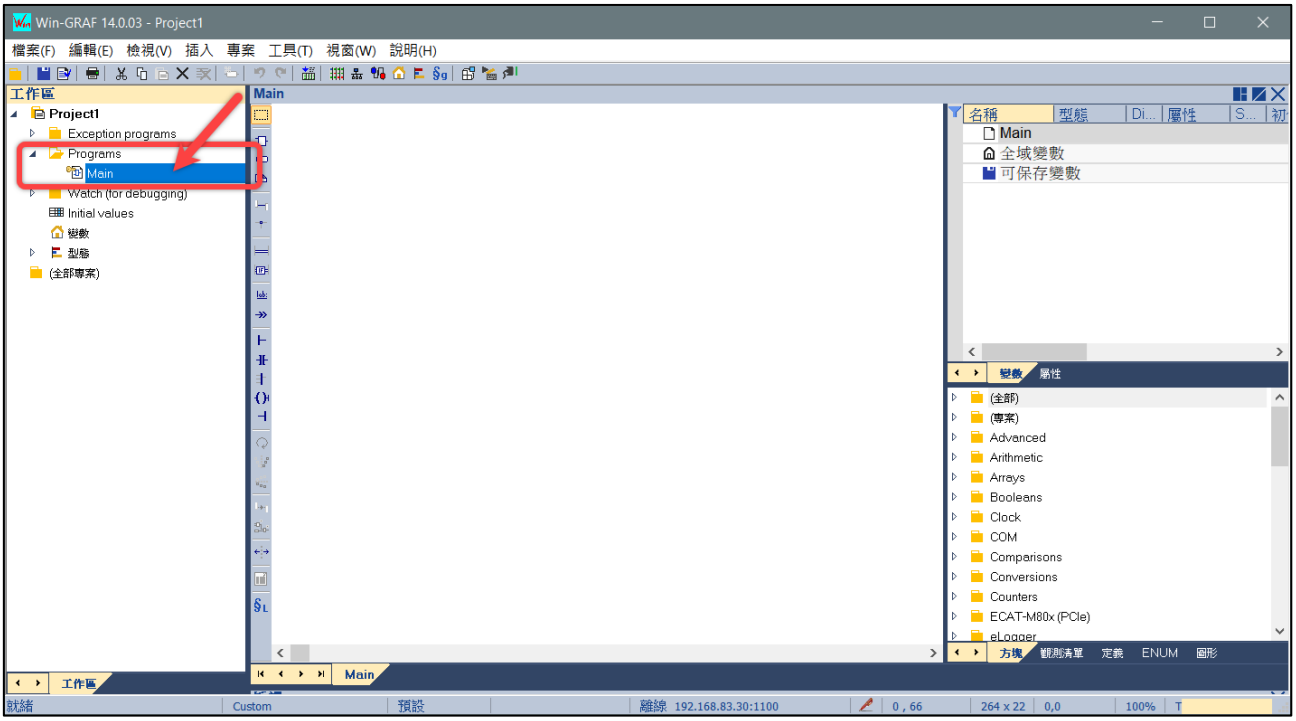
c) Select the PAC model **LP-2648M**, click **Auto detect** to scan the runtime version.

d) Choose the programming language (FBD / ST / LD / SFC). Set compile mode to **Release**.

e) Enter PAC IP address and click **Finish**.



f) Open **Programs → Main** and double-click to edit.

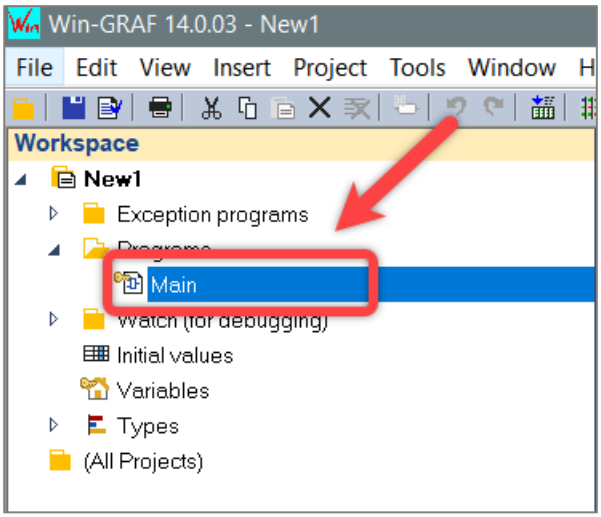


Edit program (example using FBD)

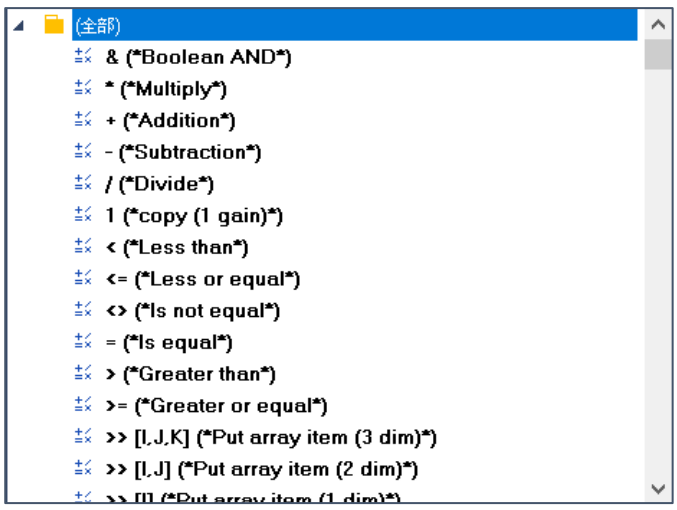
Here we use the **FBD language** as an example to write PLC logic programs.
The following steps show how to add a **function block** to the editor and declare input and output variables.

Steps:

i. Open **Main** in the editor.



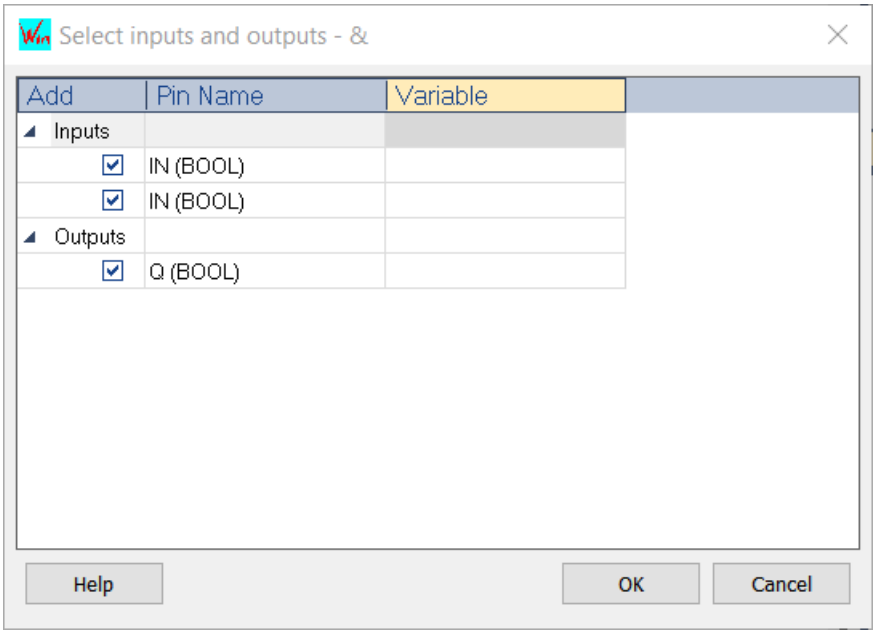
ii. From the **Blocks** pane (right side), drag an **AND** function block into the workspace.



Note: All supported function boxes are listed in the "Blocks" option on the right side of the message

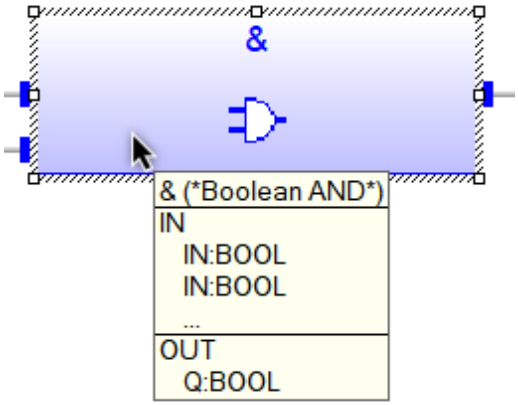
window, if the message window is not available, go to "View/Info Tab 2" in the toolbar to display the window. Function boxes are sorted according to different categories, and the "All" category list supports all function boxes. Click "All" to open the tree list, where all function boxes are displayed.

iii. Then the following window pops up:



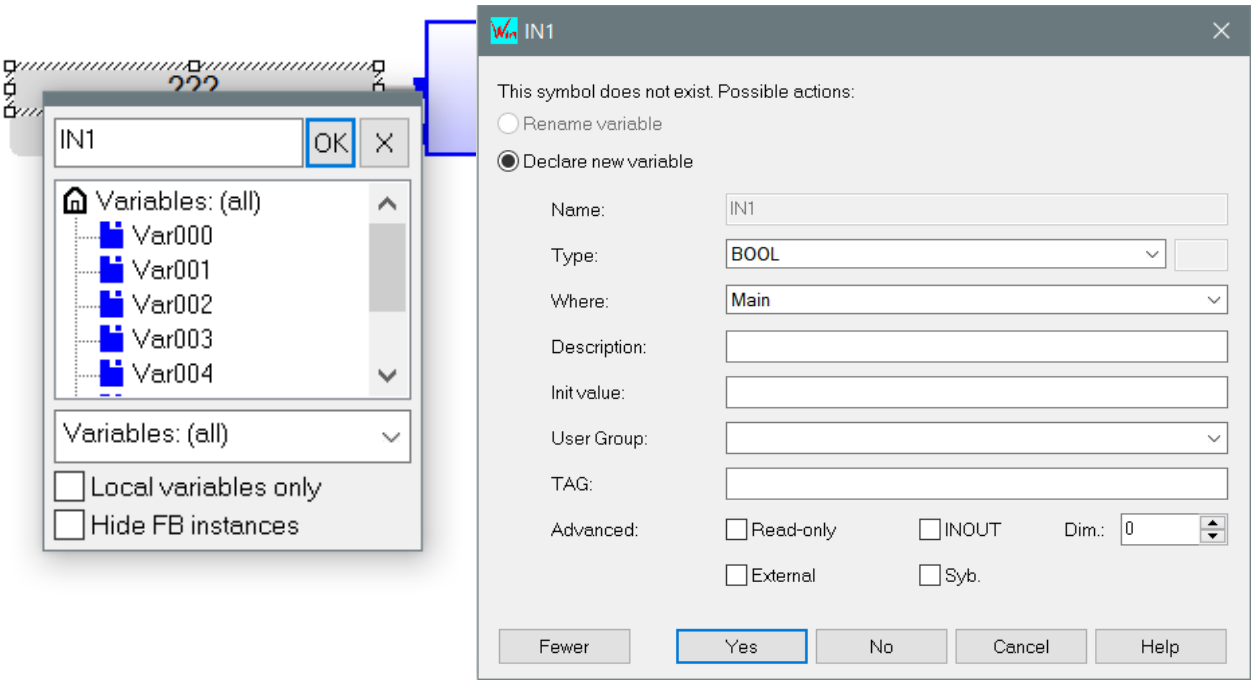
iv. The block shows two inputs and one output; unassigned variables appear as ???

v. Moving the mouse cursor over the function displays the desired input and output data types:

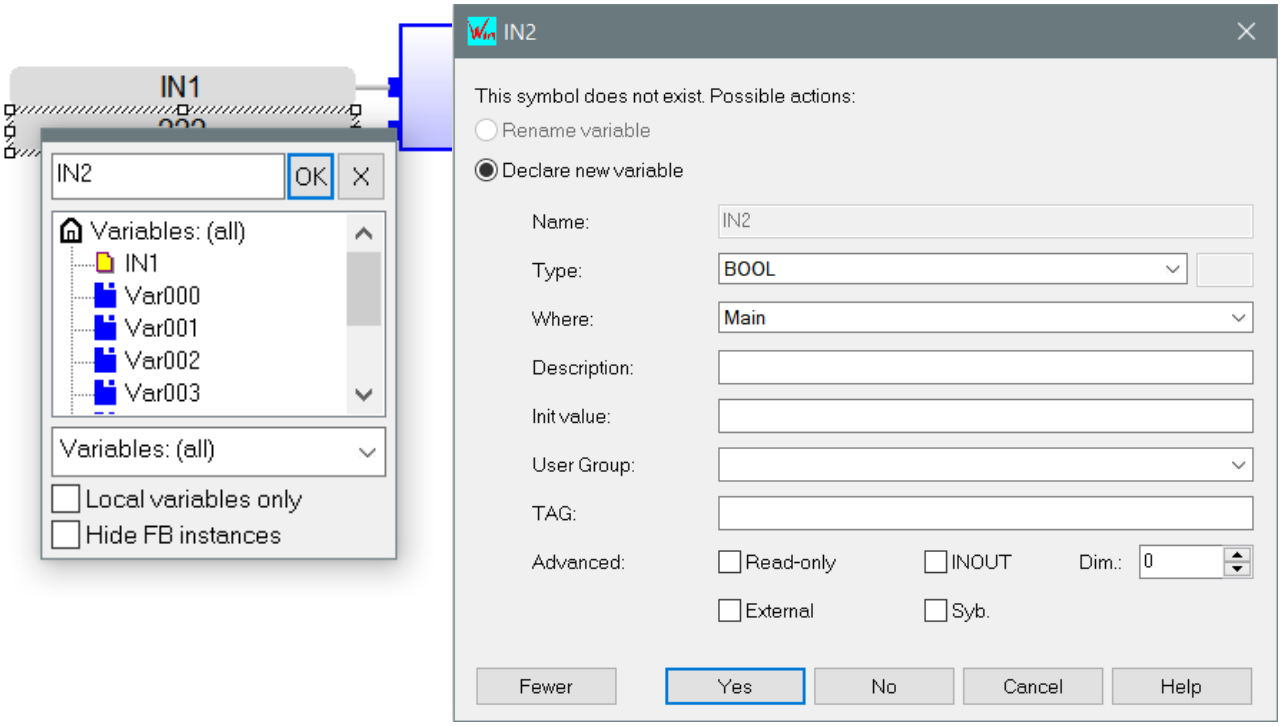


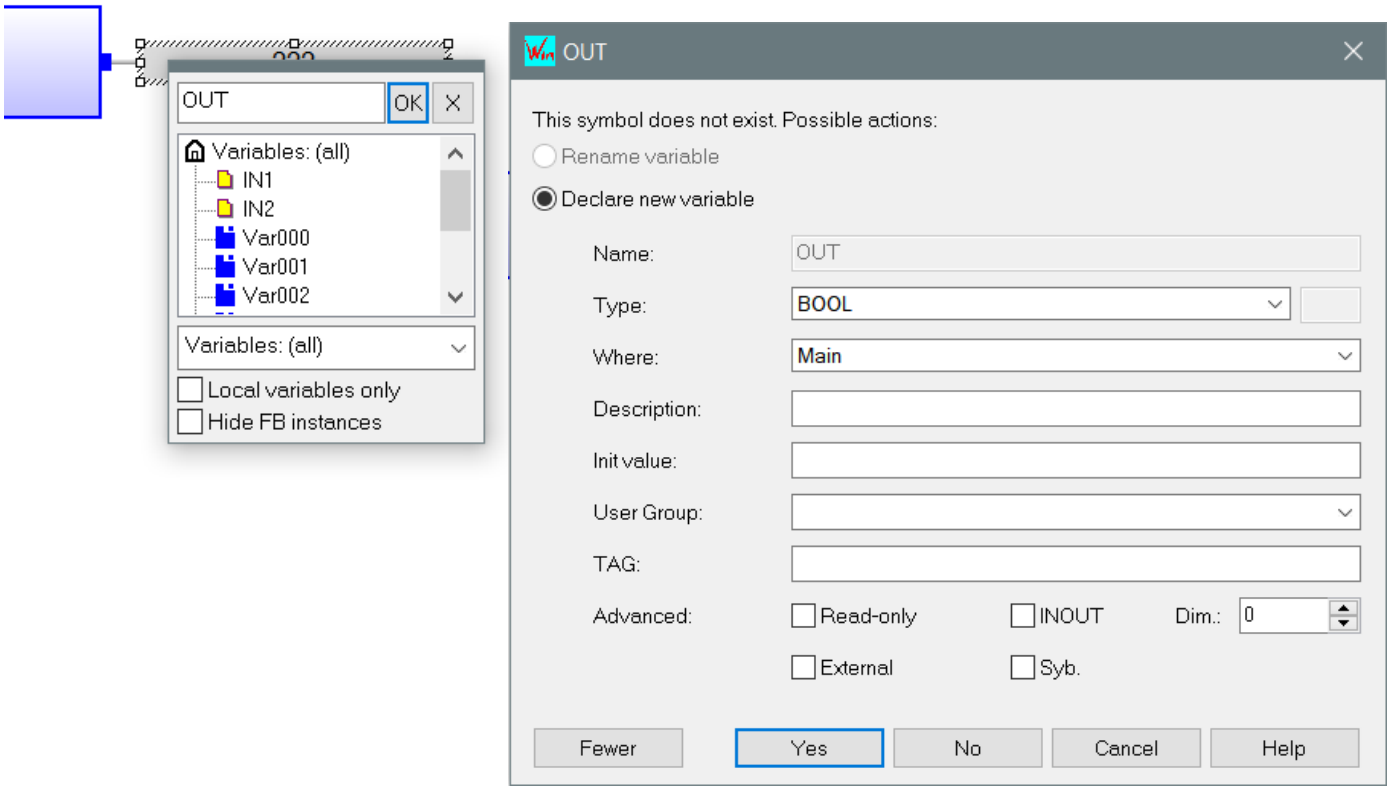
Note: Click anywhere in the main editing area and press the "+" or "-" key on the keyboard to change the size of the function box.

vi. Double-click a ??? box, enter a variable name (e.g., IN1), choose data type (e.g., BOOL), and add it to the project.

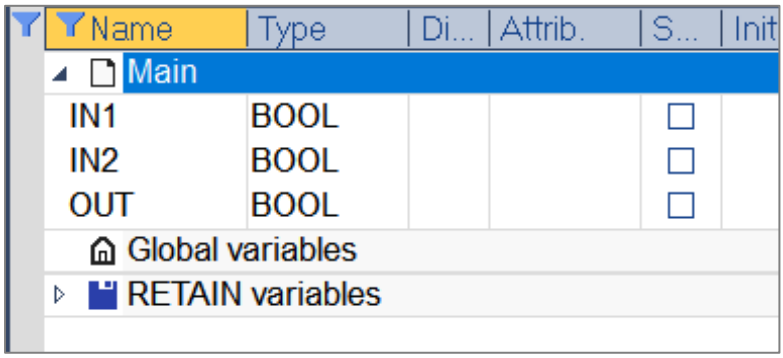


vii. Repeat for IN2 and Output.





viii. Declared variables appear in the **Variables** tab (top-right).



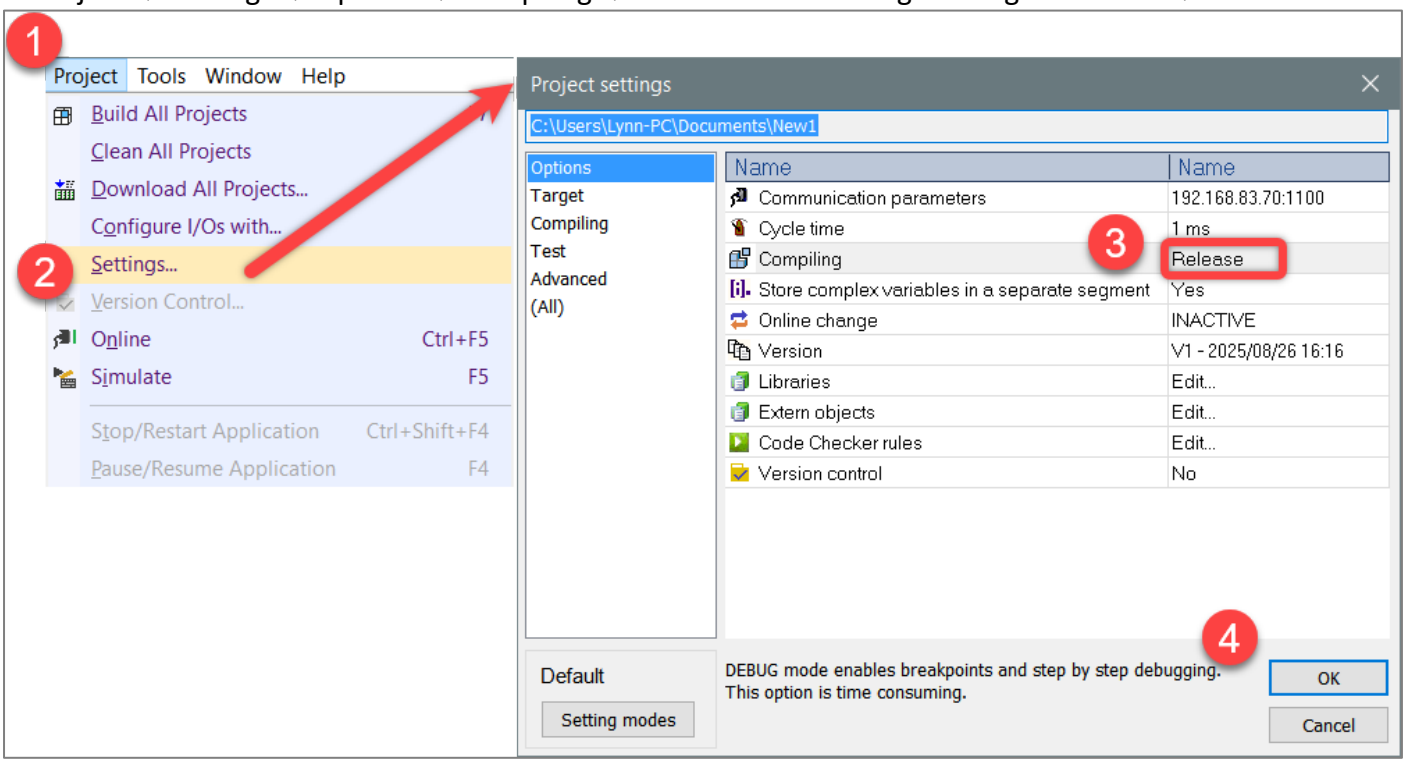
1.4 Compile and download programs

After declaring variables, compile the project and download it to the PAC. **Use Release mode** for application builds.

**For detailed debugging and release differences, please refer to the Win-GRAF Workbench manual.*

Set Release mode

Project → Settings → Options → Compiling → double-click to change Debug to Release → OK.

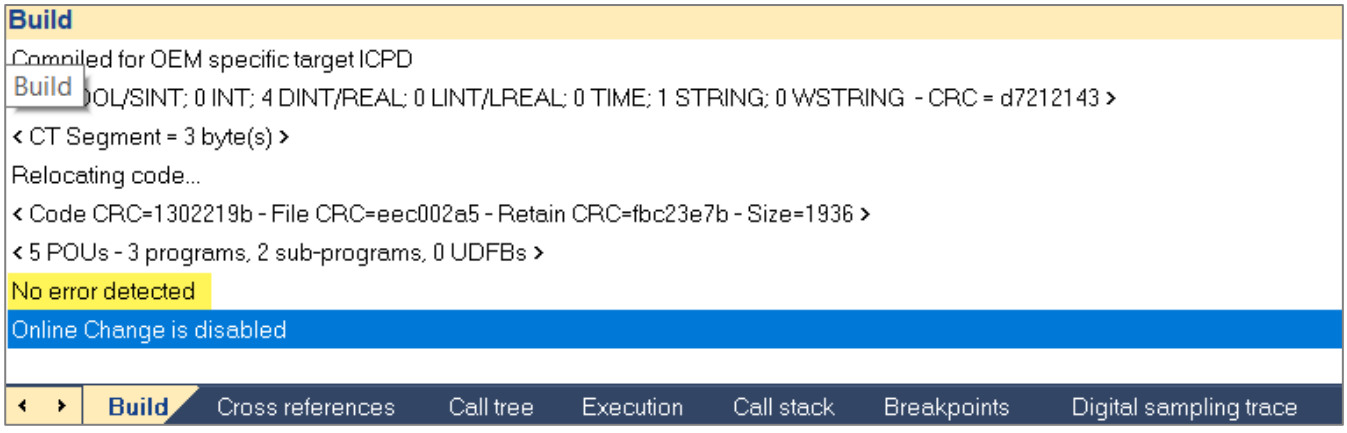


Compile

There are two ways to compile a project, which has been introduced once in the Win-GRAF Workbench manual and will not be repeated here.

a) Find the "**Build All Projects**" icon in the red box above from the toolbar and click on it.

b) If the output shows "**no errors detected**", compilation succeeded

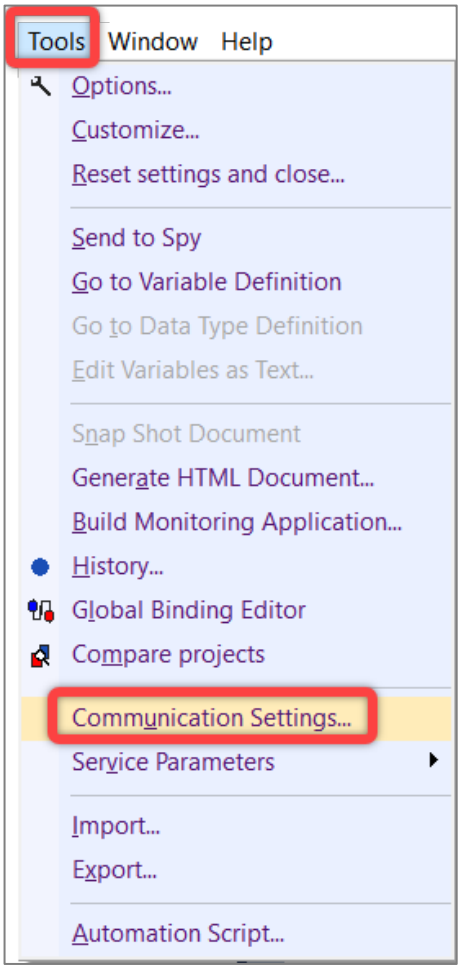


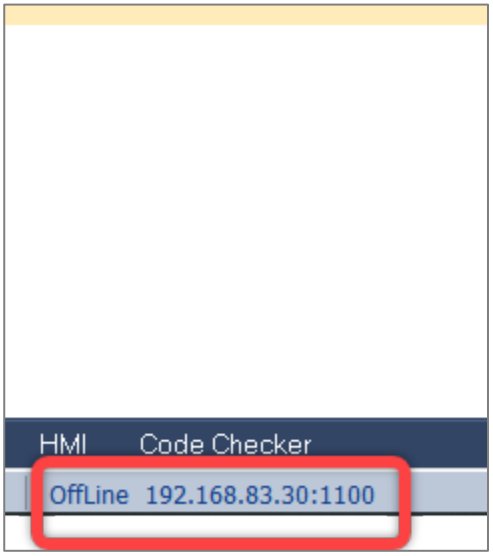
Download

After successful compilation, the application needs to be downloaded to the LP-2648M to run. Win-GRAF Workbench exchange data with the runtime over TCP/IP communication. In order to establish TCP/IP communication, Workbench needs to know the IP address and socket port number of the LP-2648M. Refer to *section 2.2* of this manual to determine how to configure and obtain communication configuration data.

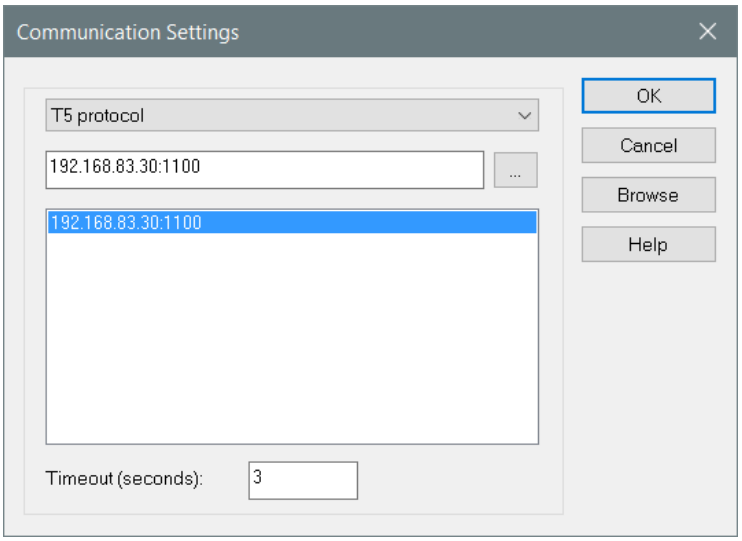
Steps:

a) Configure communication: Tools → **Communication Settings...** or double-click the offline indicator (e.g., Offline [192.168.83.30:1100]).



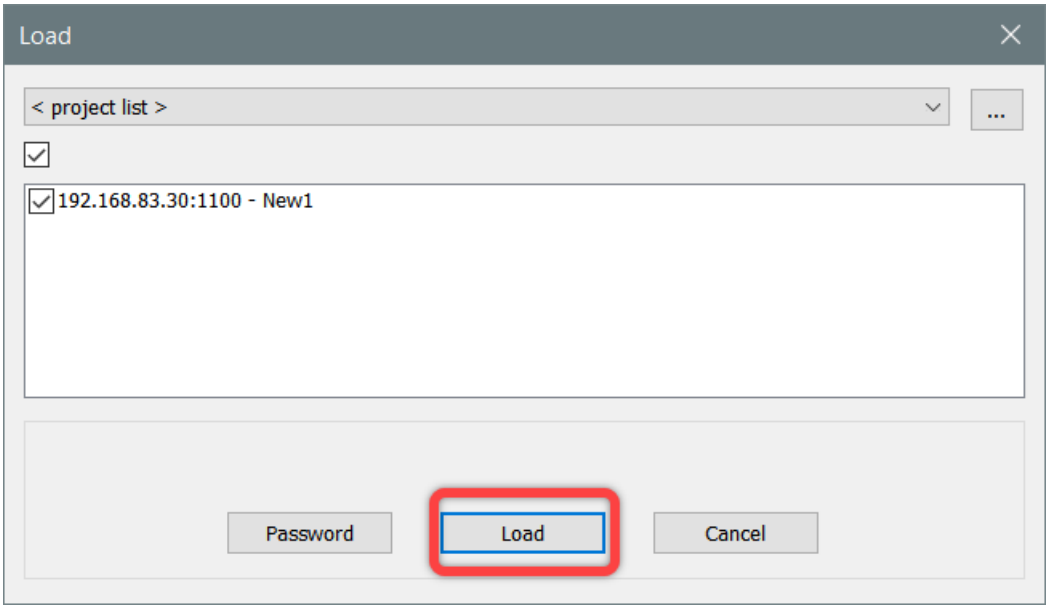


b) Enter the device IP and socket port in the format IP:port (use colon :). Click **OK**.



c) Click the **Download** icon, select the files to load, then click **Load** and wait for completion.

d) Confirm the items in the dialog window, check the profile you want to load, press the "**Load**" button, wait for it to load, and it will be completed.



Chapter 2 — Common Settings & Tools

This chapter introduces how to perform system management and common settings through the LP-2648M's built-in web management interface, including network parameters, system time, account passwords, OPC UA certificates, Win-GRAF version queries/updates, program deletion, Remote module ID settings, and device IP discovery.

Note: Before starting, ensure your computer (PC) is connected to the LP-2648M module via an Ethernet cable to ensure a proper network connection.

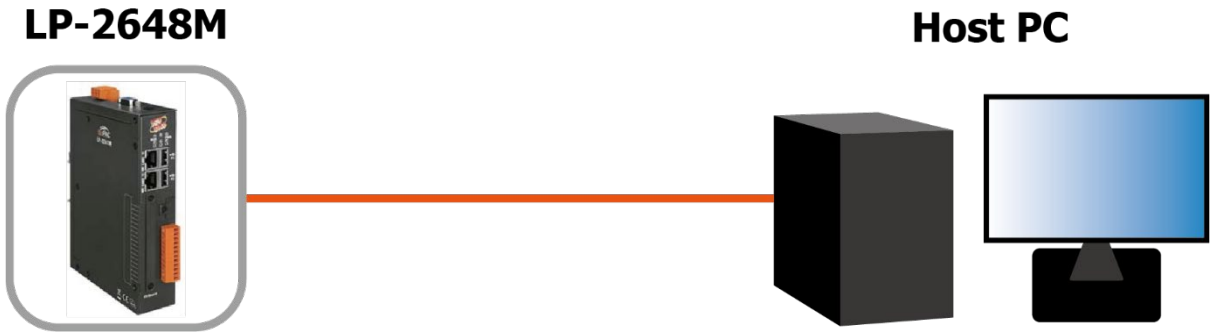
Example network settings used in this manual:

- **LAN port:** eth0
- **IP:** 192.168.83.20
- **Mask:** 255.255.0.0

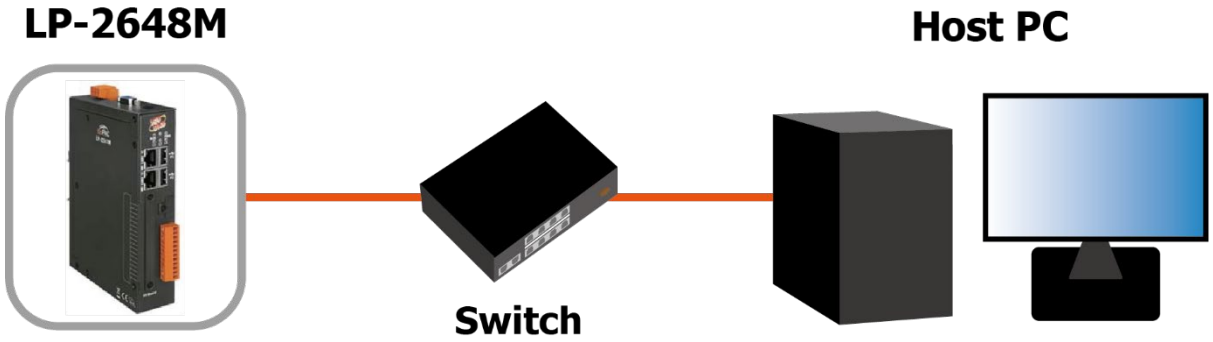
Hardware connection diagram:

There are two ways to connect the LP-2648M to a PC:

- Use an Ethernet network cable to connect **directly** to a computer (PC).



- Connect the Switch to your computer using an **Ethernet cable**.



2.1 LP-2648M Web Management Interface Login and Description

LP-2648M provides a built-in web interface for functional settings. It can be accessed using any device with a web browser (PC, smartphone, tablet) connected to the same local area network (LAN) as the LP-2648M.

Default Login Credentials:

Before logging into the web management interface for the first time, you need to know the LP-2648M's default network address, username, and password.

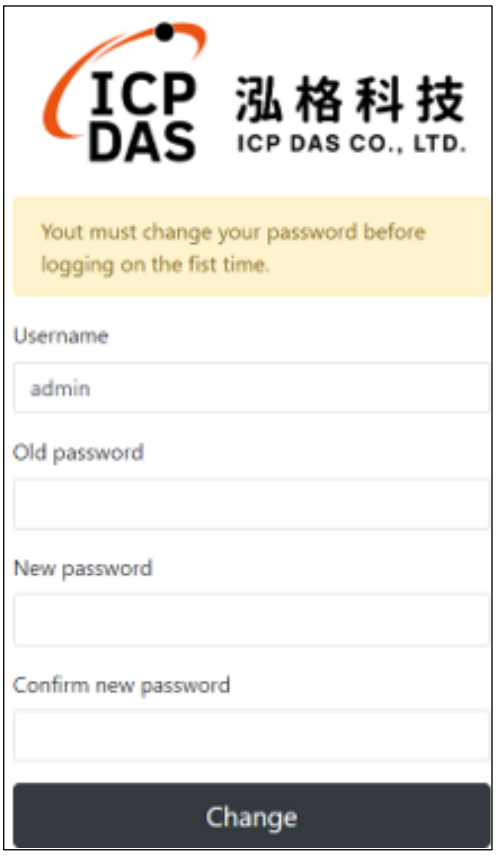
LP-2648M Default Information	
Default network	Default login
IP address: 192.168.255.1	Username: admin
Subnet Mask: 255.255.255.0	Password : admin

Note: *Older web browsers may not be fully compatible with this management interface. It is recommended to check or install the latest version of your browser before use.*

Login Steps:

1. **Launch Browser:** Enter the default IP address (192.168.255.1) in the address bar.
2. **Initial Login:** Use the default username and password.
3. **Change Credentials:** Upon the first successful login, the system will require you to change the username and password.

Warning: *Please keep your credentials safe, as the system does not provide a query function.*

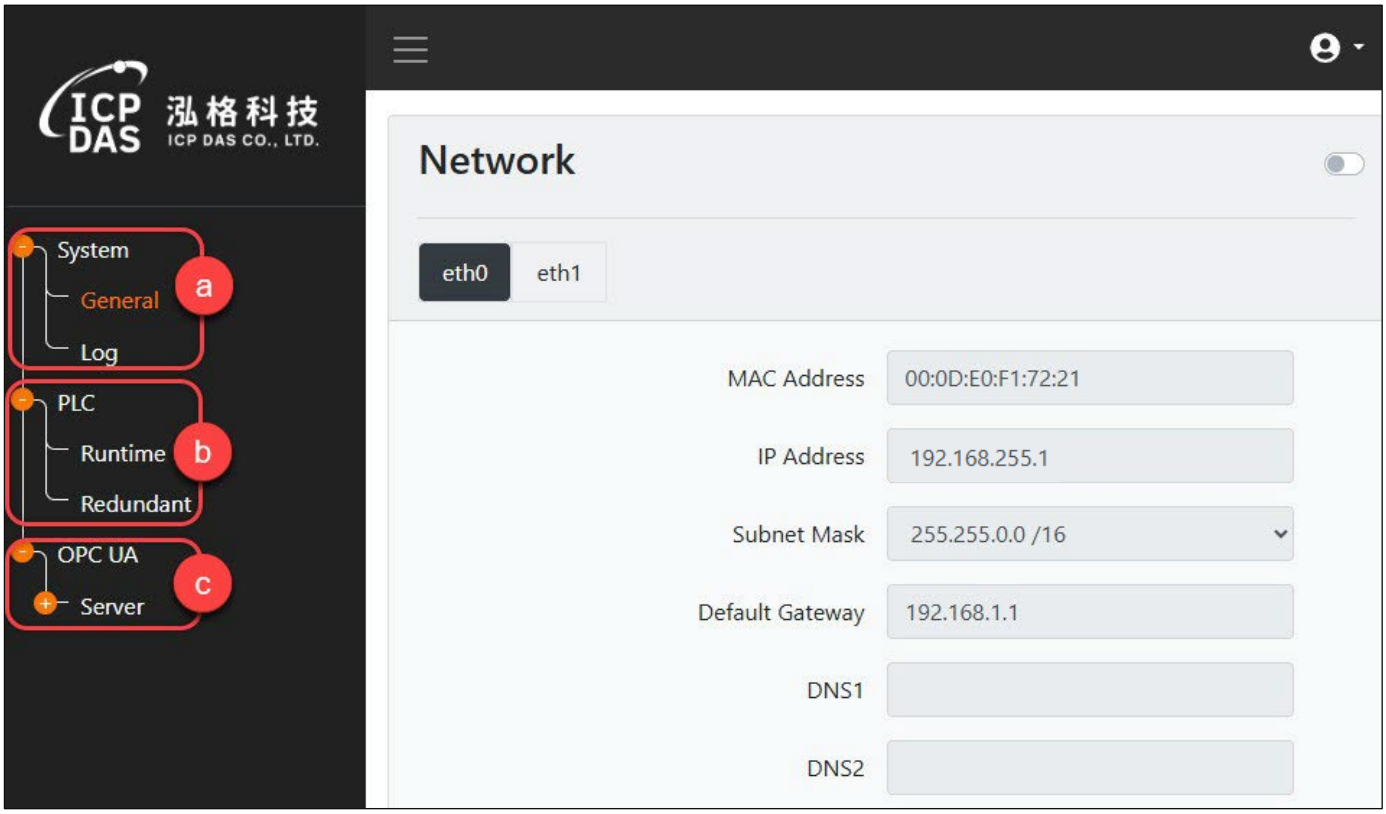


- **Troubleshooting (if the login window does not appear):**

1. Restart the LP-2648M.
2. If using a static IP on your PC, ensure it is in the same segment as the LP-2648M with matching subnet masks.
3. Verify the IP address in the browser address bar.
4. Try a different browser or clear browser cookies/cache.

Interface Overview:

After logging into the web management interface, you will see the icons displayed below, from which you can operate and configure the LP-2648M.



The web management interface provides the following settings:

I. System

- Configure network settings (IP / Mask / Gateway)
- Set date and time
- Perform software updates
- View system configuration logs
- Check software version

II. PLC

- Control Win-GRAF Runtime Start/Stop
- Redundancy control (not supported on LP-2648M)

III. OPC UA

- Configure OPC UA Server certificates

2.2 Setting the LP-2648M IP Address / Mask / Gateway

The LP-2648M has two Ethernet interfaces (**eth0** and **eth1**) that can be configured independently. Please follow the steps below:

Steps:

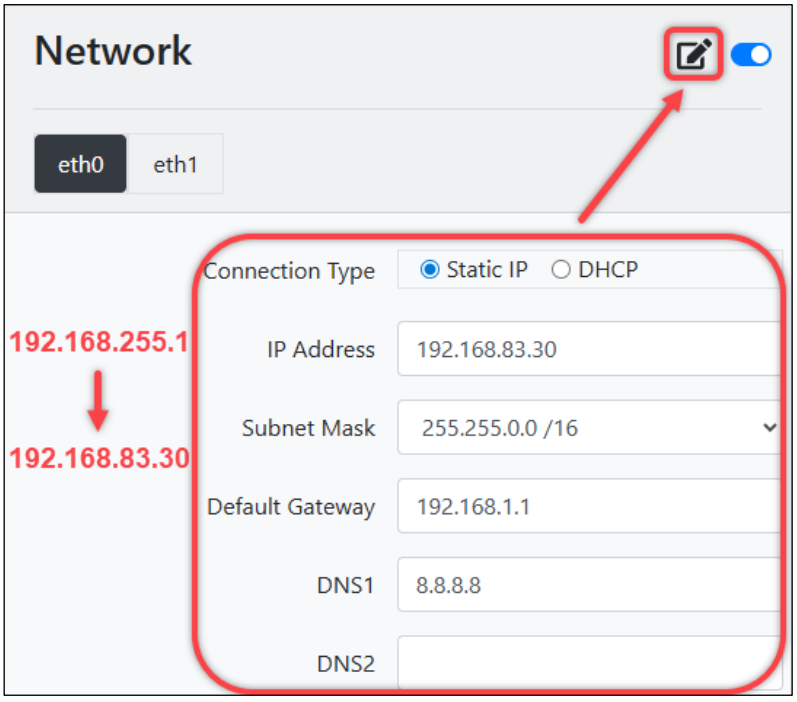
1. Log in to the web interface and navigate to **System > General**

2. Choose the network port you want to modify (eth0 or eth1).
3. Click "**Edit** " to enter edit mode . Once you enter **Edit Mode** , you can modify the settings.

LP-2648M Default Address:

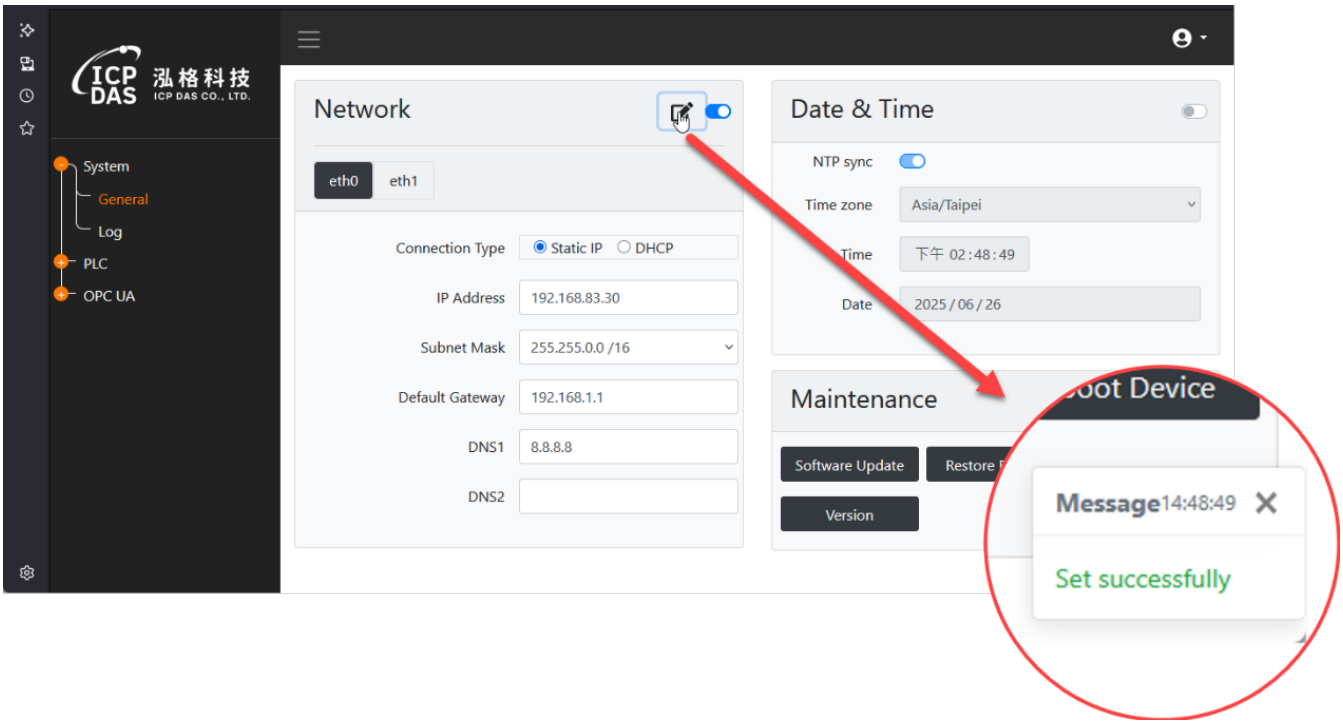
名稱	eth0	eth1
IP address	192.168.255.1	192.168.1.1
Mask	255.255.255.0	255.255.255.0

5. Modify the **Connection Type** (Static IP or DHCP), **IP Adress**, **Subnet Mask**, and **Default Gateway**. Click the **Save/ Edit** icon to apply changes.



Example: IP Address 192.168.255.1 change to 192.168.83.30

After saving successfully, a notification message will appear at the bottom-right of the web management interface confirming that the settings have been applied.



Note: *You must re-login using the new IP address to continue configuration.*

2.3 Configure LP-2648M System Date and Time

The system time can be synchronized in two ways:

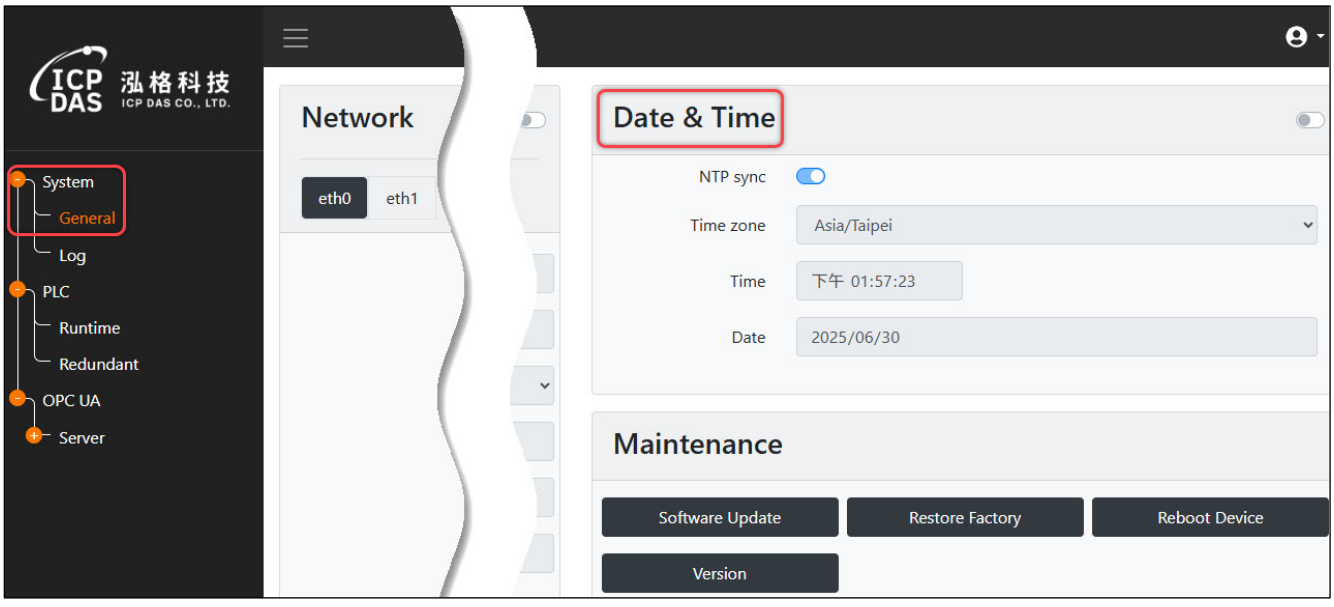
- Automatic network synchronization
- Manual time update

Note: *Only one method can be used at a time.*

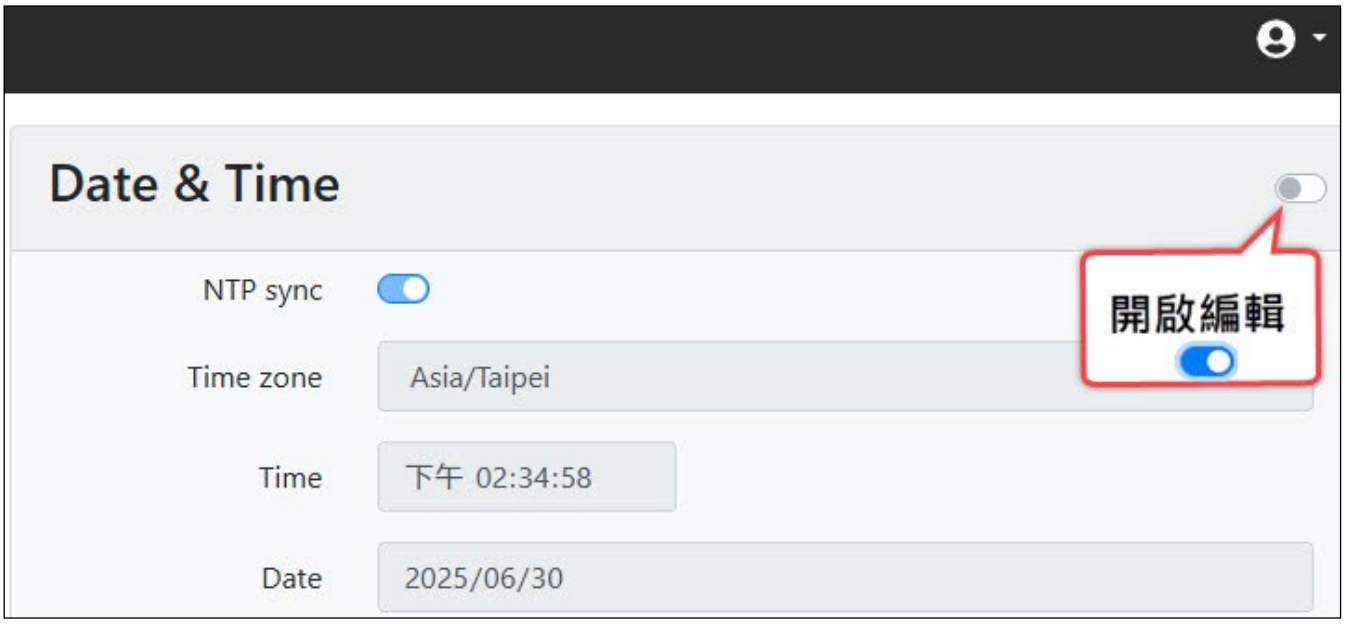
Steps to configure:

Log in to the LP-2648M web interface

1. Select System > General, Navigate to **Date & Time**.



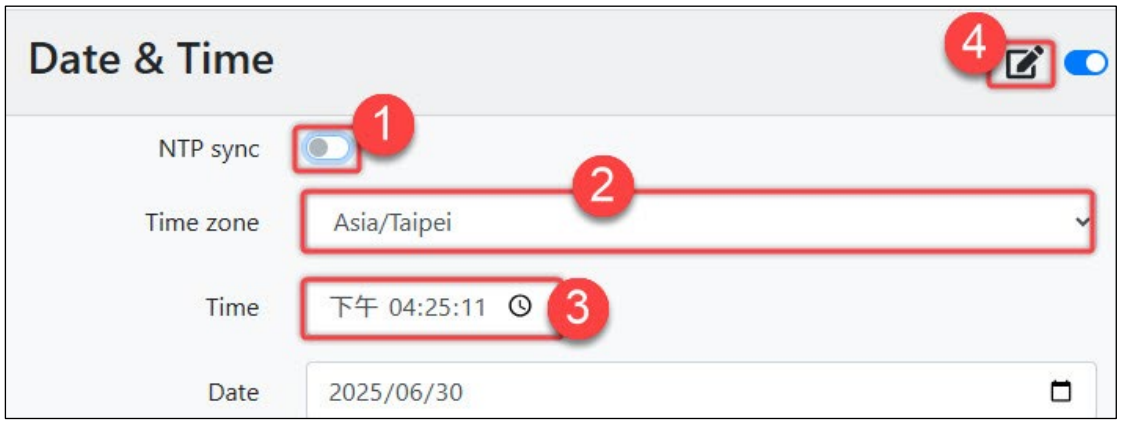
2. In the **Date & Time** section, toggle **Edit Mode** .

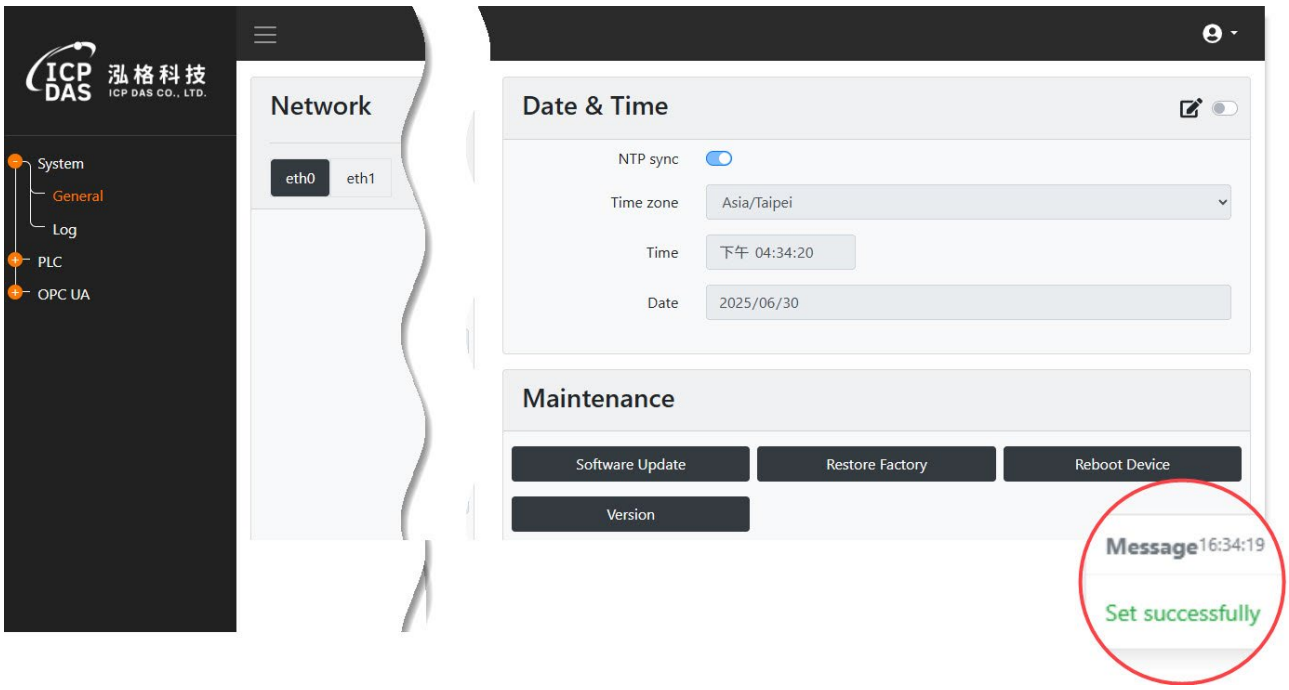


- **Automatic Network Time Synchronization**
  1. Click to enable **"NTP sync"**.
  2. Select the appropriate **Time zone**.
  3. Click **Save** to apply the settings.

*Before enabling **NTP sync** for time synchronization, make sure the entire LP-2648M network environment is correctly configured. This includes proper external network connectivity, a correctly set **Default Gateway**, and valid **DNS settings**. Only when these are properly set will the synchronization take effect.*

- **Manual System Time Update**
  1. Disable **“NTP sync”**.
  2. Select the appropriate **Time zone**.
  3. Modify the system date and time.
  4. Click **Save** to apply the settings.





After saving successfully, a notification message will appear at the bottom right of the web management interface confirming that the settings have been applied.

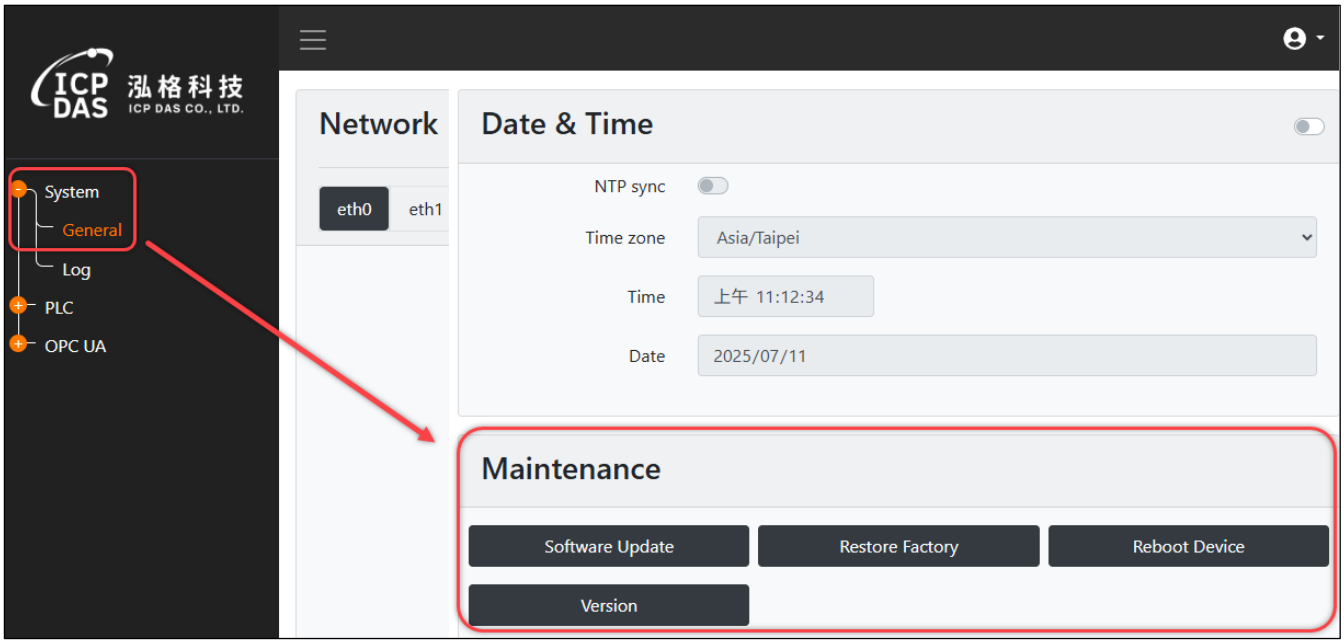
2.4 Querying/ Update the Win-GRAF Version

Through the LP-2648M web management interface, you can Query or update the Win-GRAF Runtime version. Please follow the steps below:

Querying LP-2648M Win-GRAF Runtime version

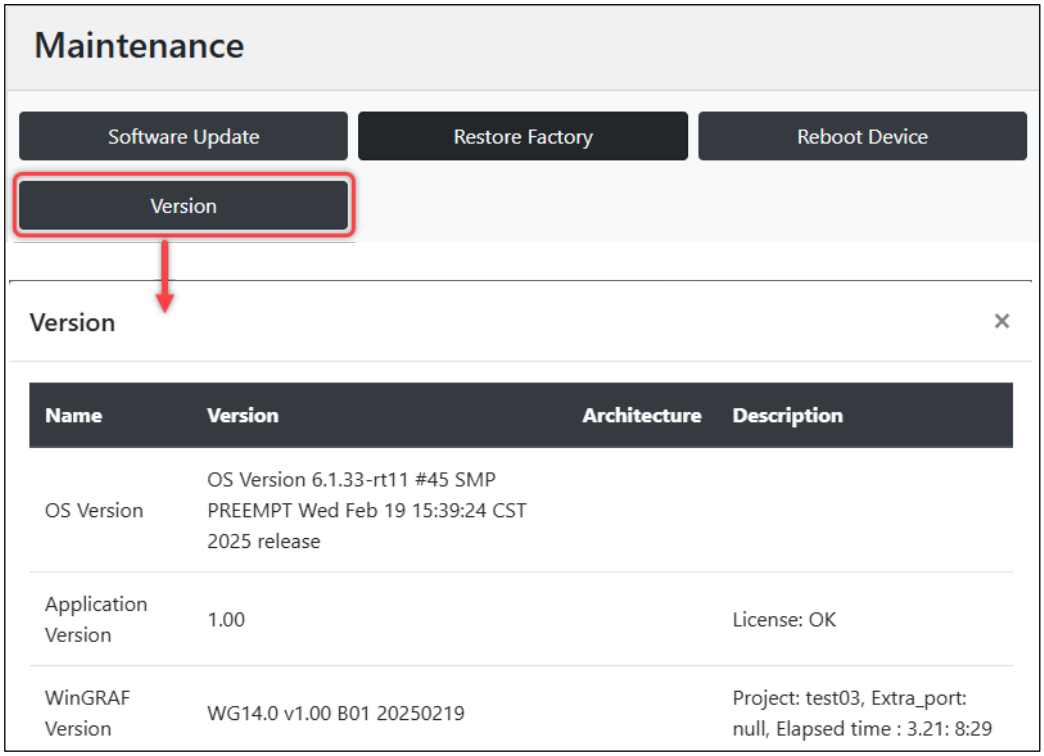
1. Log in to the web management interface and select **System > General**.

The **Maintenance** section will appear at the bottom-right of the interface, as shown in the figure below.



2. Click **"Version"** in the **Maintenance** section.

A message window will pop up displaying the version information for the **OS**, **applications**, and the **Win-GRAF Runtime**.



Updating LP-2648M Win-GRAF Runtime

There are two ways to update the LP-2648M Win-GRAF Runtime:

- ❖ Using the Web Management Interface (Software Update)
- ❖ Using a USB Flash Drive

- **Web Interface (Software Update)**

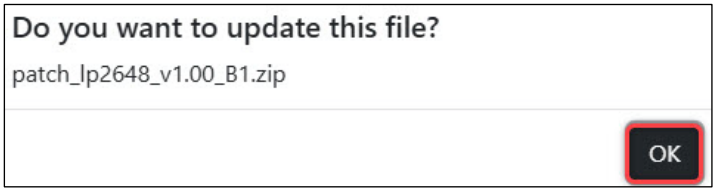
1) Download the update patch from the ICP DAS website.
https://www.icpdas.com/en/product/guide+Software+Development Tools+Win-GRAF#2713

Win-GRAF Runtime驅動程式與函式庫:

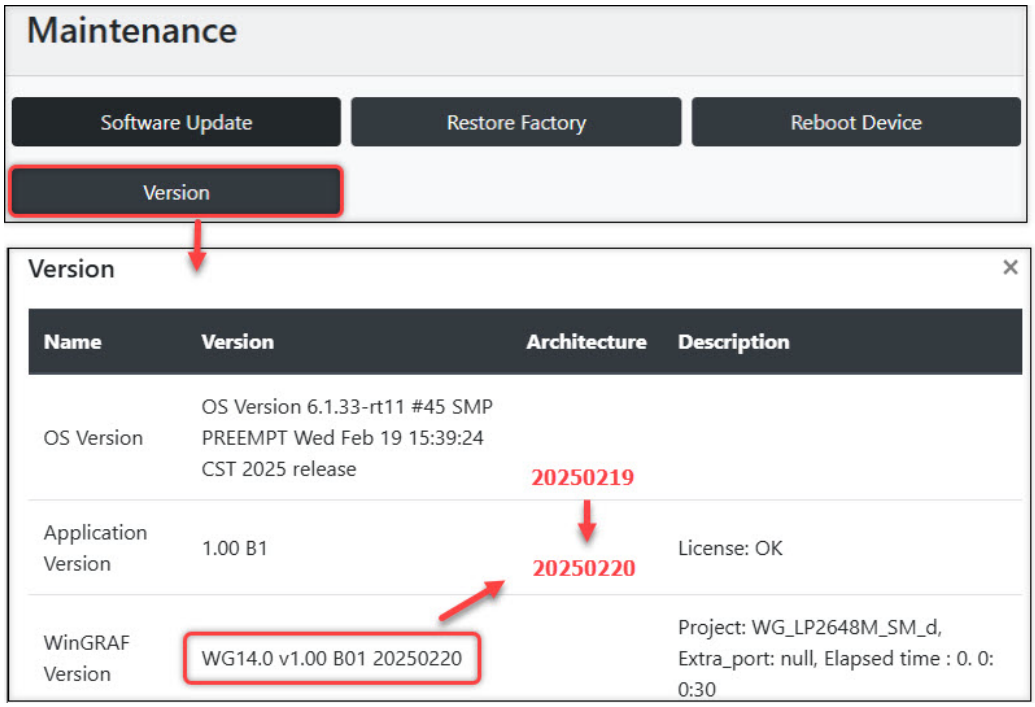
名稱	版本	檔案日期	下載點	備註
Lin PAC Runtime	1.0.0	2025-08-26	取得更新檔	Lin PAC 版 驅動 (更新說明)

2) Click **Software Update** in the Maintenance menu.
3) Select the downloaded .zip file.

4) Confirm with "OK" and reboot the device using the **Reboot Device** button to apply the update.



5) Click **Version** button in Maintenance section to confirm the latest Win-GRAF Version.



- **USB Flash Drive**

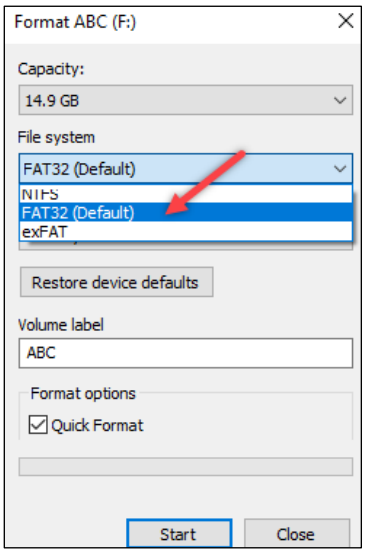
1) Download the update patch from the ICP DAS website.

https://www.icpdas.com/en/product/guide+Software+Development__Tools+Win-GRAF#2713

Win-GRAF Runtime驅動程式與函式庫:

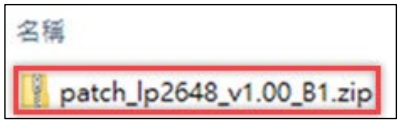
名稱	版本	檔案日期	下載點	備註
Lin PAC Runtime	1.0.0	2025-08-26	取得更新檔	Lin PAC 版 驅動 (更新說明)

2) Format a USB drive to FAT32.

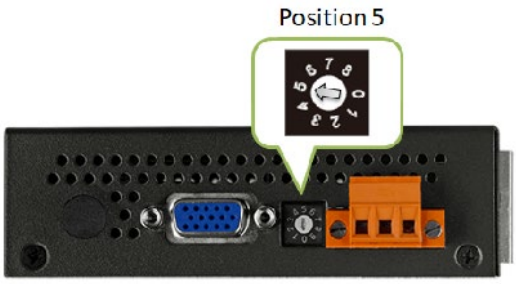


3) Place the update file in the root directory.

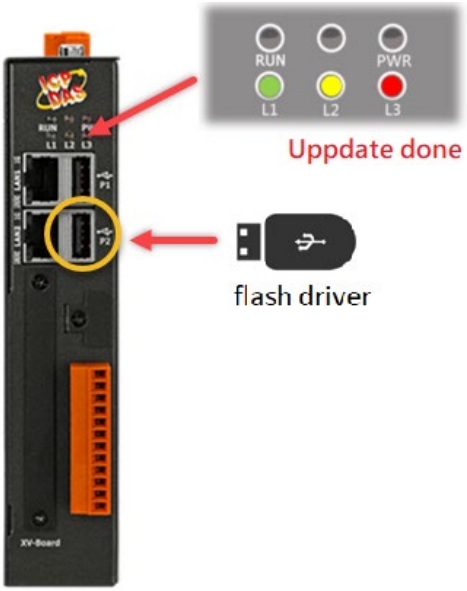
※Note: In the directory should have only one file.



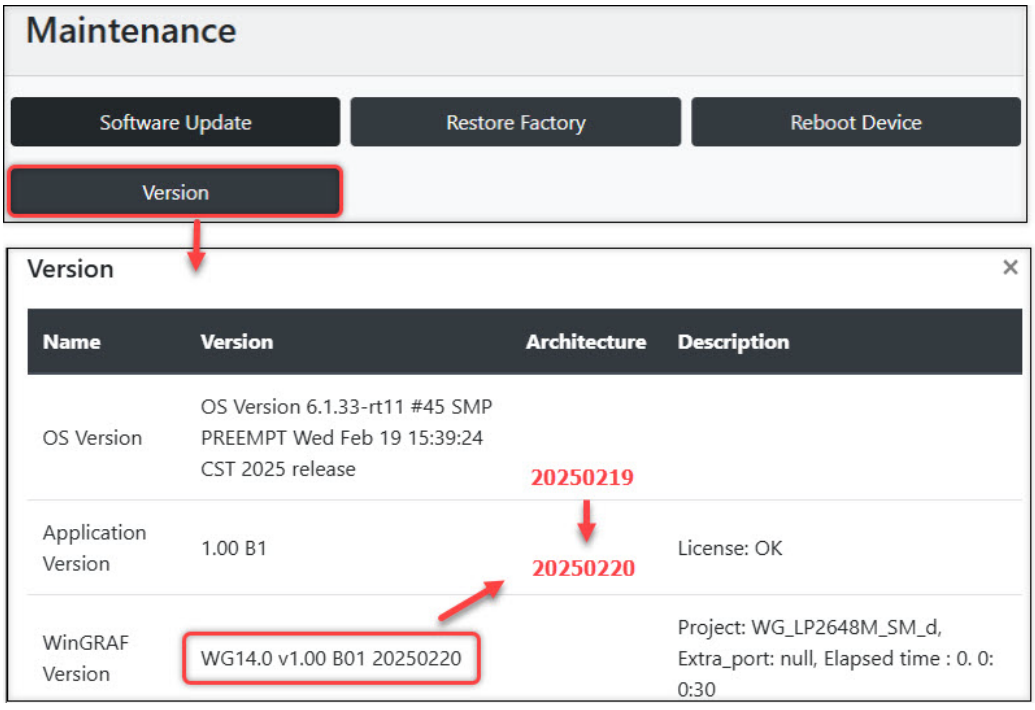
4) Turn the **Rotary switch** to **5** and power off the LP-2648M.



5) Insert the USB drive and restart. When LED lights L1, L2, and L3 are all lit, the update is complete.



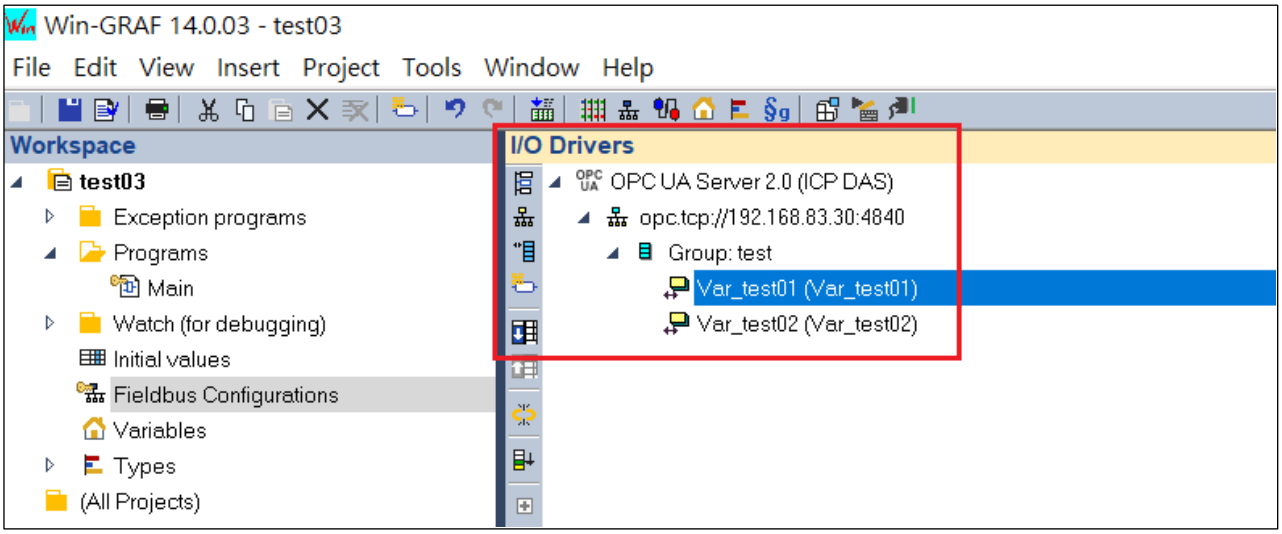
6) Restart the device and check the version in the web interface.



2.5 OPC UA Server Certificate

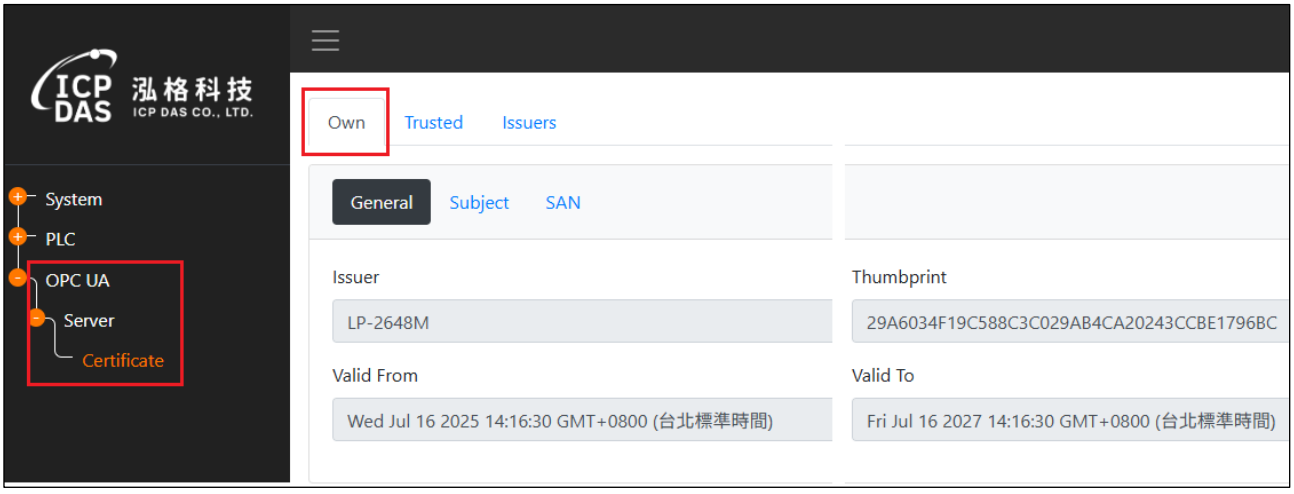
The contents of this page are used to manage the certificate files of the Win-GRAF Runtime OPC UA Server to ensure the security of communications.

Before accessing the web interface to configure the certificate, please first enable the OPC UA Server via the Fieldbus function in Win-GRAF and complete the configuration of parameters and variables. In this example, **two BOOL variables** have already been bound, as shown in the figure below.



For more detailed instructions on configuring the OPC UA Server, please refer to Chapter 8 of the *Win-GRAF User Manual*.

After completing the above configuration, download the program to the LP-2648M. You can then view the certificate-related settings via the Own page.



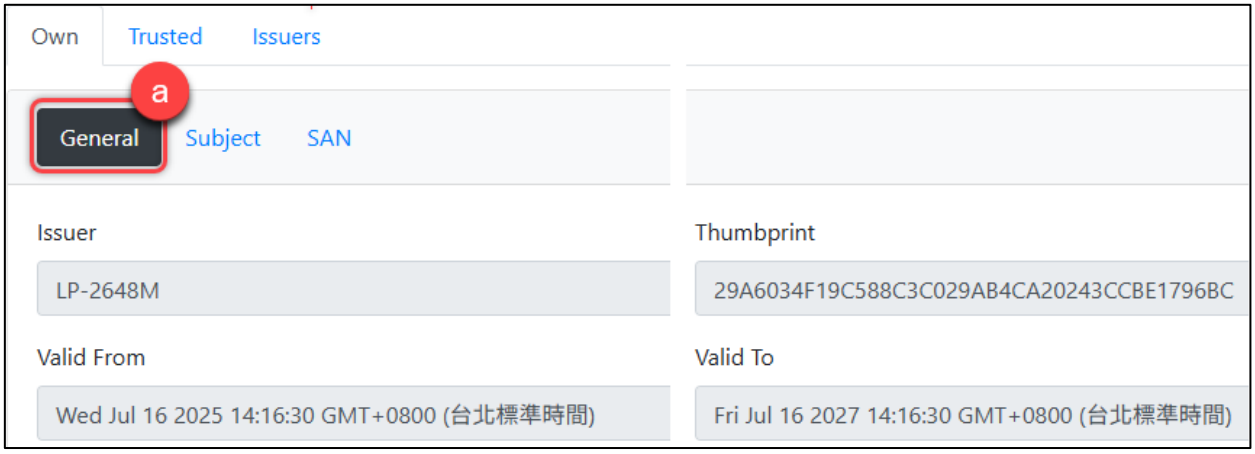
Certificate Management Pages:

The contents of this page are used to manage the certificate files of the Win-GRAF Runtime OPC UA Server to ensure the security of communications. The following is a detailed description of the contents of each tab:

※Own

This tab displays existing server certificates and allows the creation of new self-signed certificates. Detailed information about server certificates can be accessed through the eneral/Subject/SAN tabs. The following details are explained:

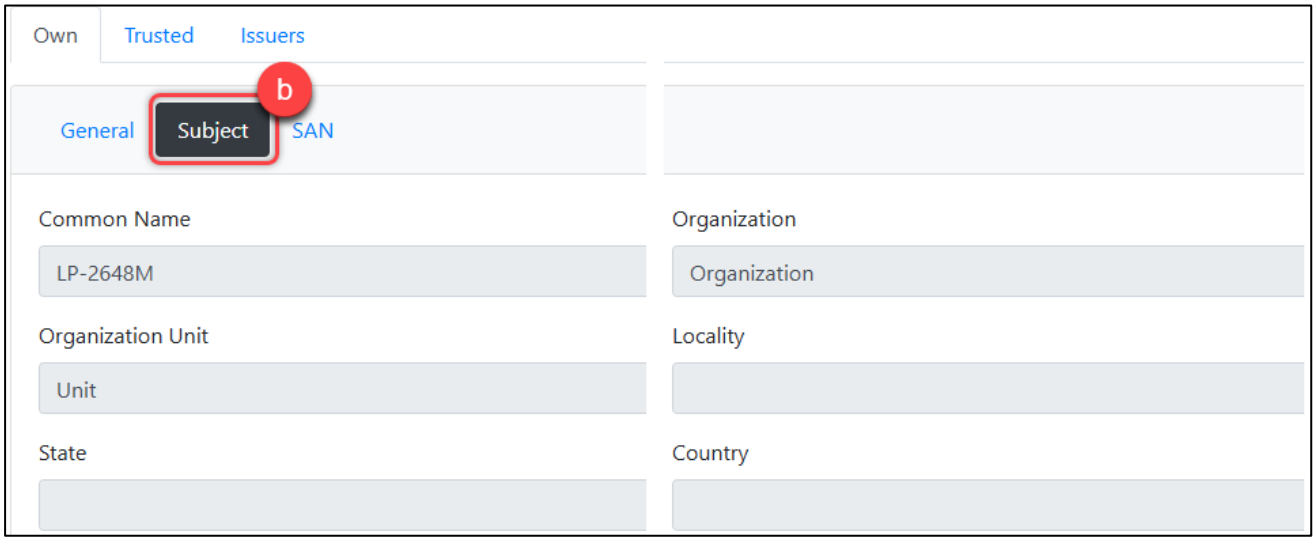
a. General: General information



Item	Description
Issuer	Issuer name.
Thumbprint	This is commonly called a “fingerprint”.
Valid From	Start date of certificate.
Valid To	Expiry date of a certificate.

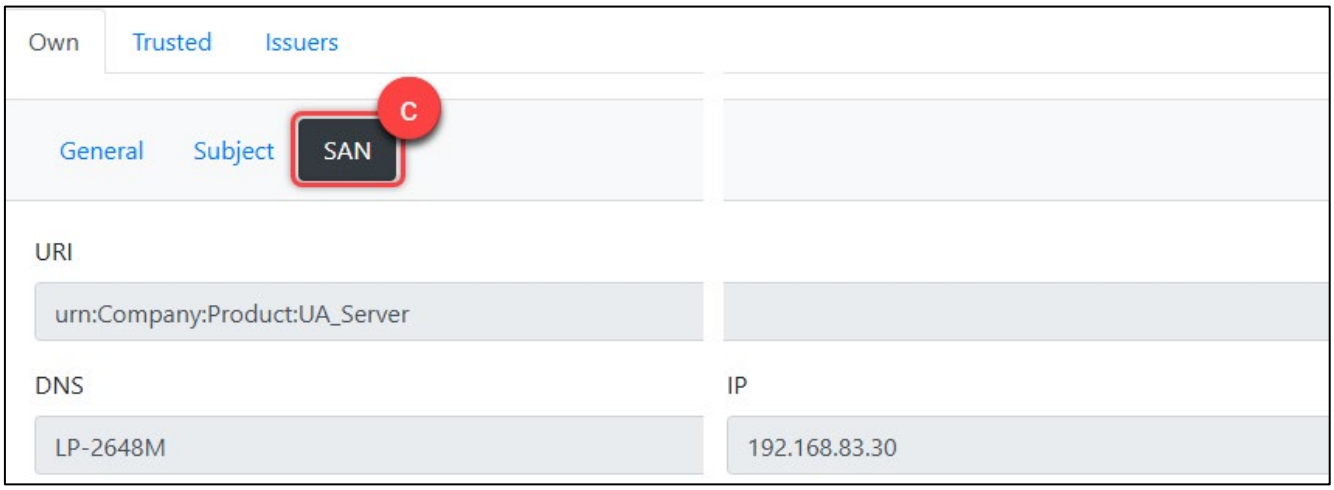
Note: The Own page of the OPC UA Server Certificate is used to display detailed information about the certificate currently in use. This page is read-only, and certificate modifications or configuration changes cannot be performed here.

b. Subject: Subject field



Item	Description
Common Name	Host Name / Device Identifier
Organization Unit	Organization Name
State	Organizational Unit
Organization	Locality / City
Locality	State / Province
Country	Country Code

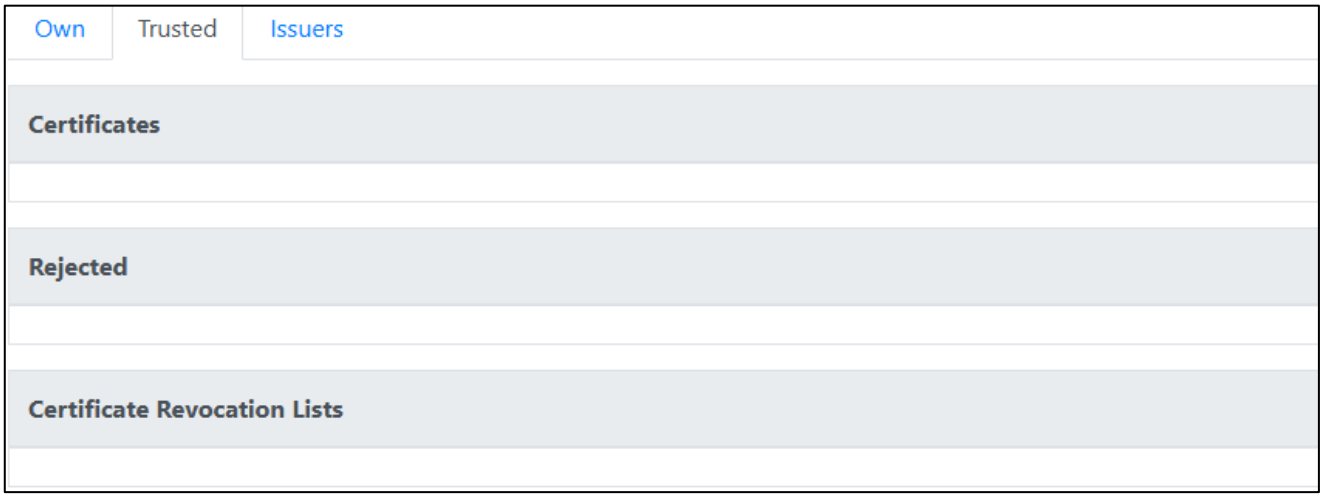
c. SAN: Subject Alternative Name



Item	Description
URI	Uniform Resource Identifier.
DNS	Domain Name System. Use commas to separate multiple entries.
IP	IP Address. Use commas to separate multiple entries.

※Trusted

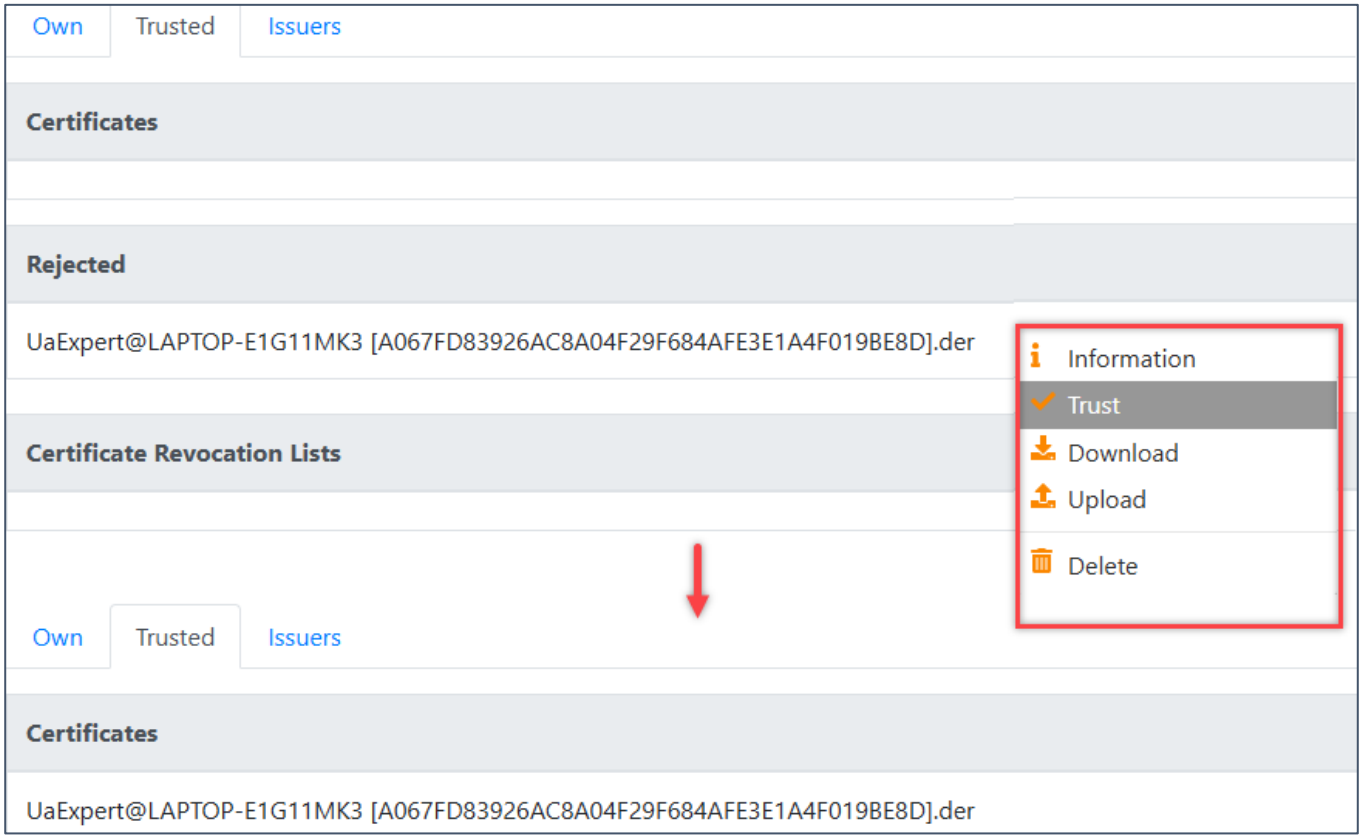
Used to manage server trust and rejected certificates.



Item	Description
Certificates	List of trusted certificates.
Rejected	List of rejected certificates.
Certificate Renovation Lists	Certificate Revocation Lists of trusted certificates.

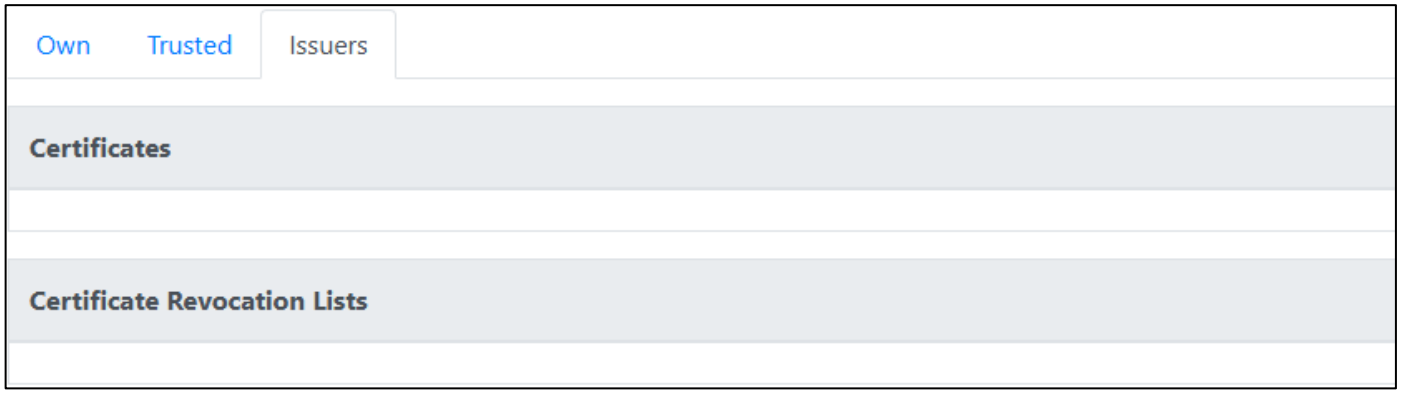
You can also trust or reject specific certificates. Steps described in the next page.

In “**Trust**” page, the right-click menu of the Certificates/Rejected/Certificate Revocation Lists file list is as following capture. Move the certificate to the trusted certificate list. (This option is available only in the rejected certificate list.)



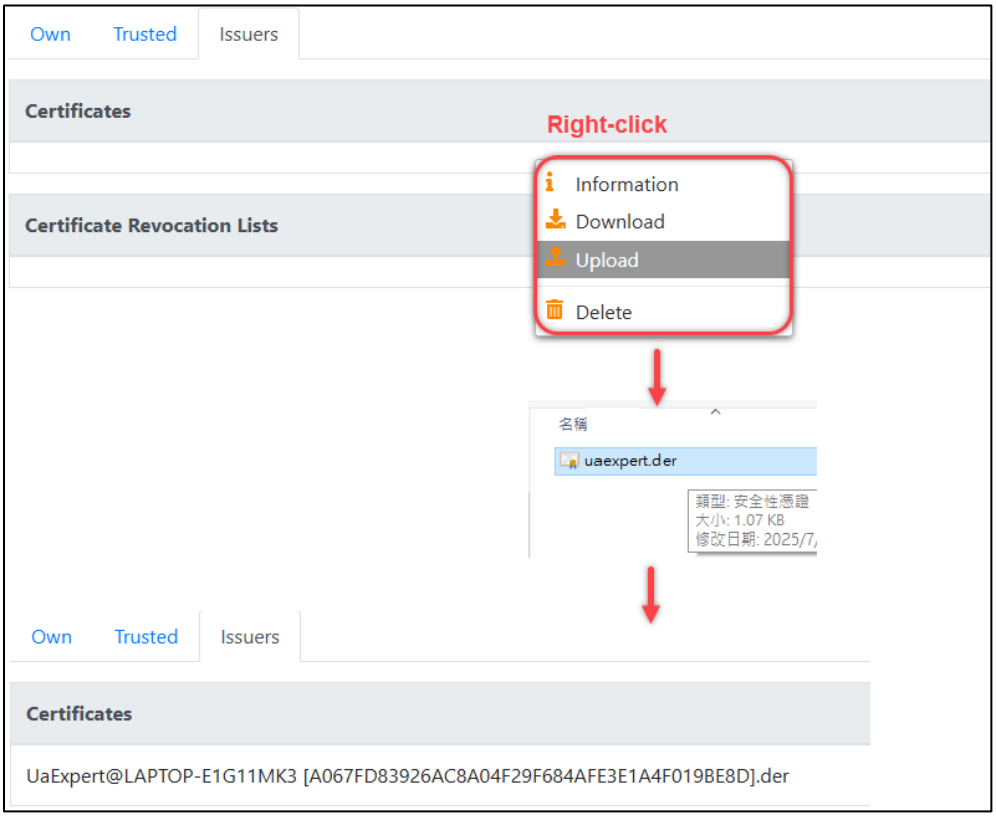
※Issuers

Manage issuer certificates. An issuer certificate is used to verify the legality and authenticity of other certificates. It establishes a trust chain to ensure that it comes from a trusted source.



Item	Description
Certificates	List of issuer certificates.
Certificate Renovation Lists	Certificate Revocation Lists of issuer certificates.

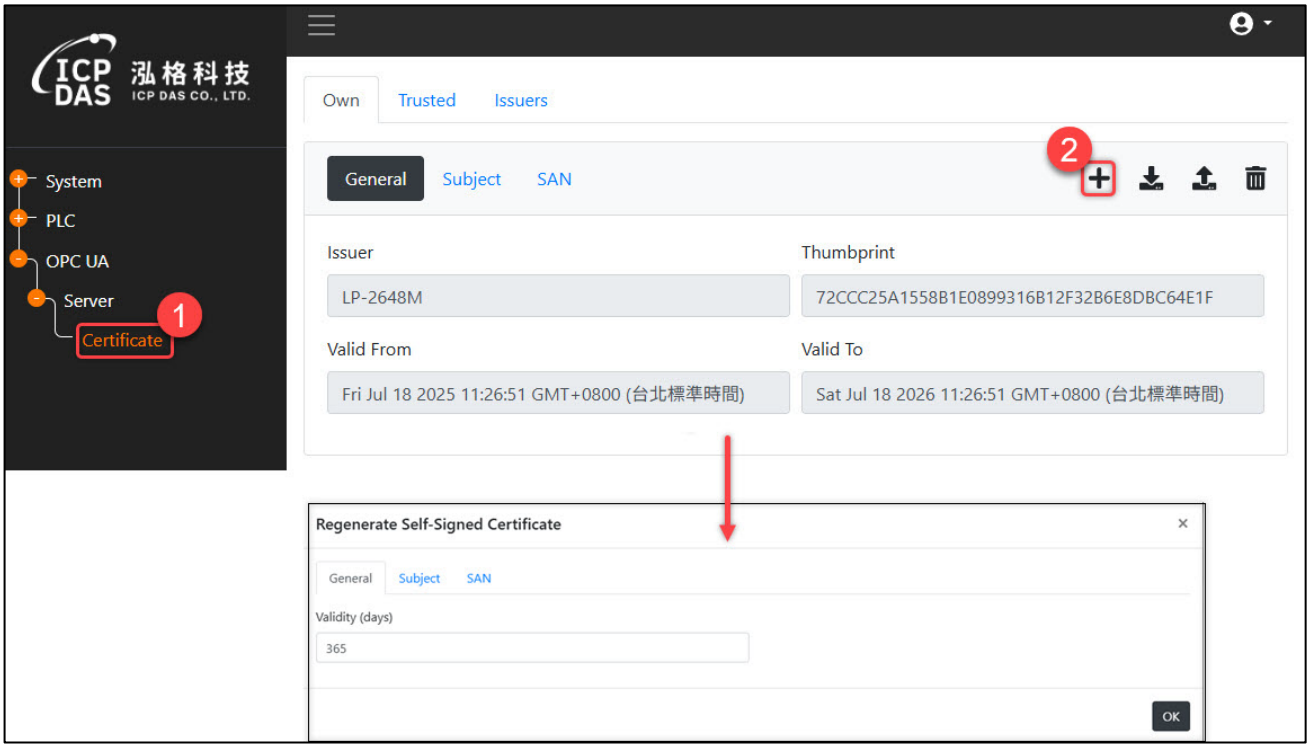
The right-click menu of the Certificates/Rejected/Certificate Revocation Lists file list is as follows. Click **Upload** and select the certificate file to uploading.



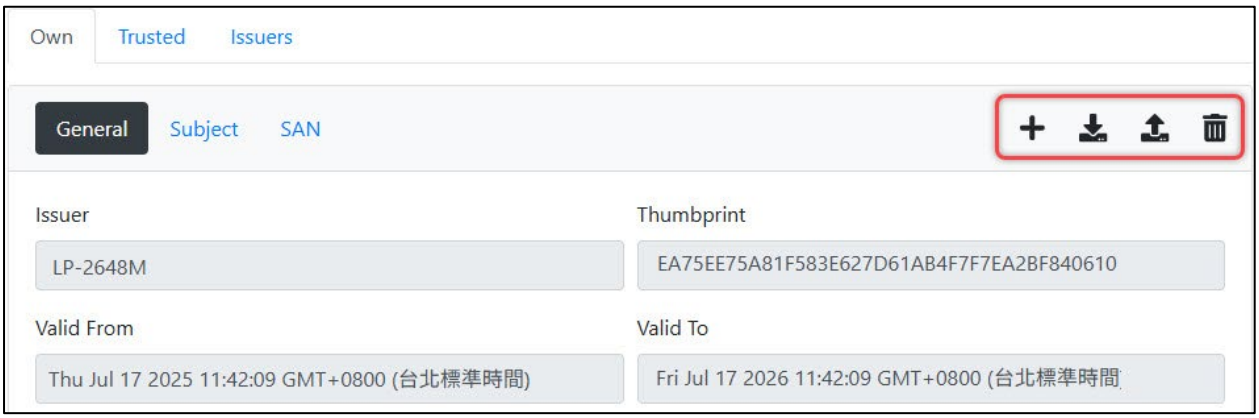
Regenerate Self-Signed Certificate > Function Description

A. Steps to Regenerate the Certificate

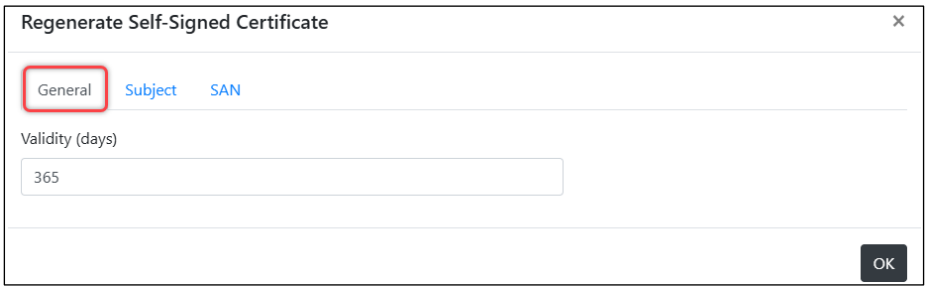
1. Navigate to the "Own" page under "OPC UA Certificate".
2. Then click the + button on the right side of the page— this will open the "Regenerate Self-Signed Certificate" page.

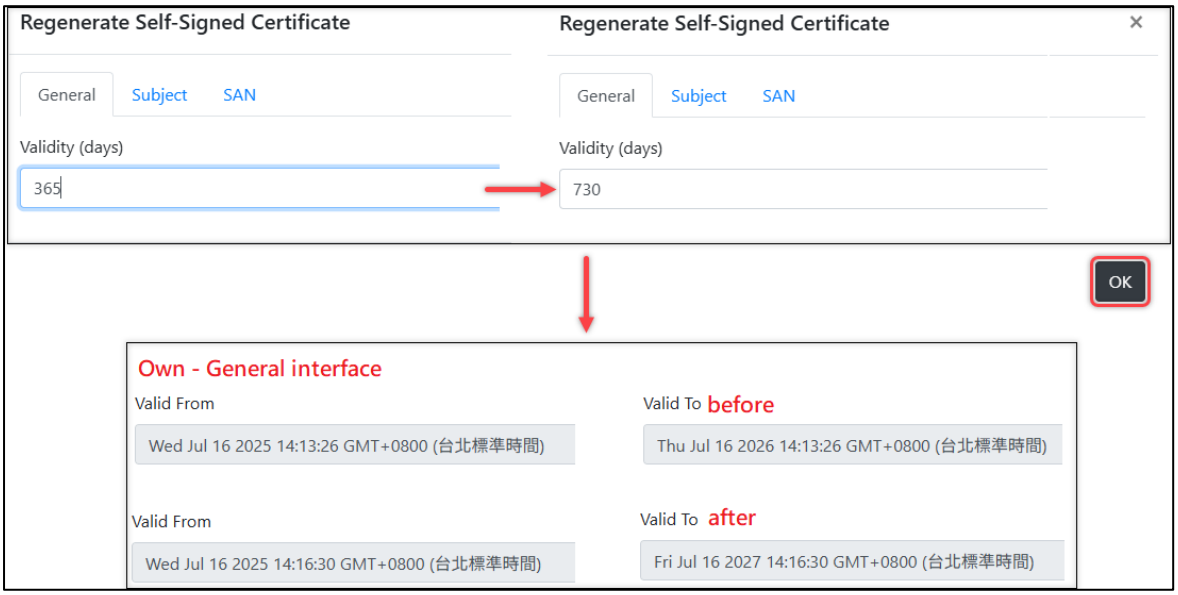


3. When regenerating the self-signed certificate, the content on the page will carry forward from the previous certificate, as shown in the figure below.



If you need to change the certificate content, it is recommended not to modify it directly. Instead, set the certificate's validity period (Validity (days)).





Note: *If you delete the existing certificate and then generate a new one, the system will not automatically retain the original settings. The user will need to re-enter the certificate information or re-download the program via Win-GRAF.*

After completing the self-signed certificate setup, use the UA Expert testing tool to verify the connection and confirm that both the OPC UA Server and the certificate settings are functioning correctly.

Item	Description
Regenerate	Regenerate Server Certificate
Download	Download Server Certificate
Upload	Upload Server Certificate
Delete	Delete Server Certificate

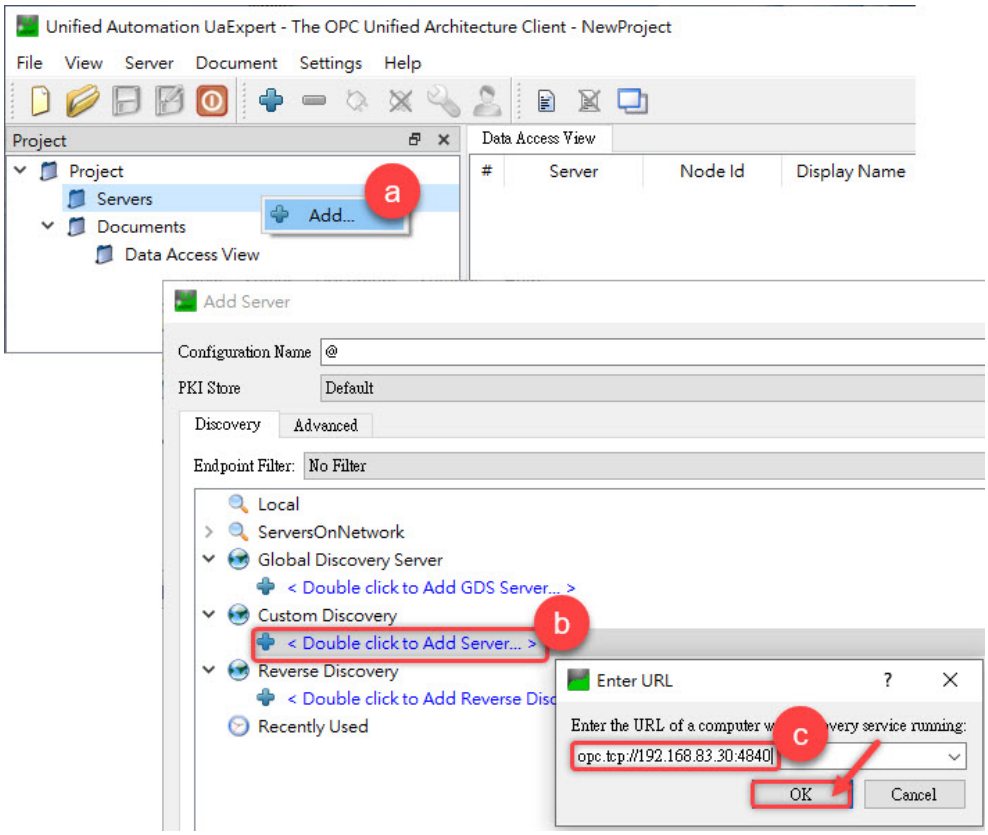
B. Connection Test with UA Expert

1. Use UA Expert to search for the OPC UA Server

a. Right-click **Project > Servers**, then click **Add**

b. The **Add Server** window will appear. Double-click <Double click to Add Server>.

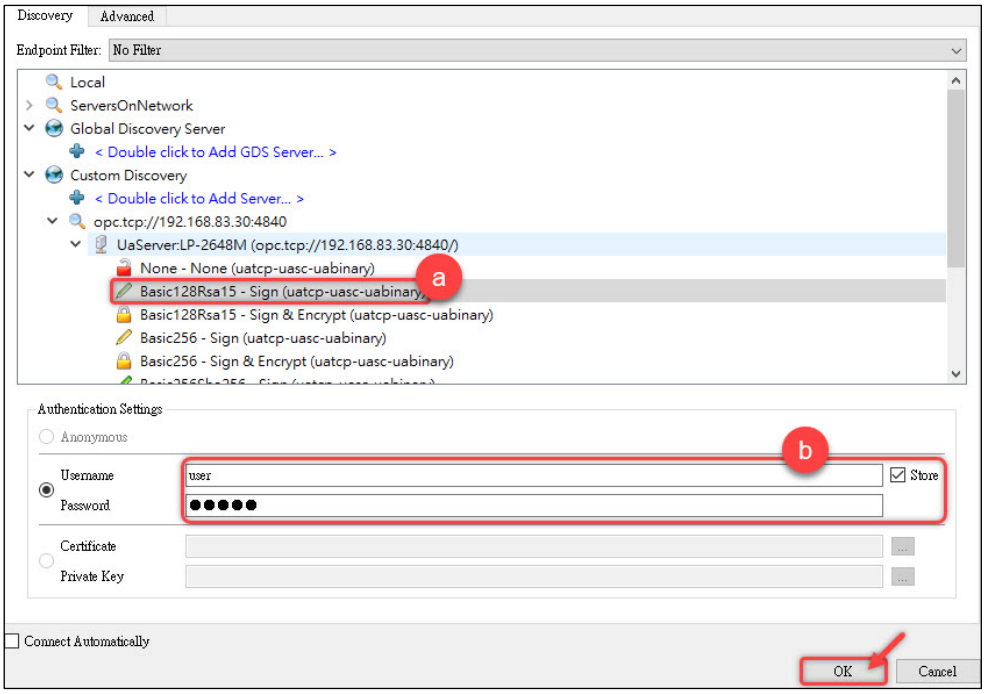
c. Then the **Enter URL** window will appear. Enter the Server IP and port here (as shown below), then click **OK**.



2. Set the Data Encryption and Authentication Method

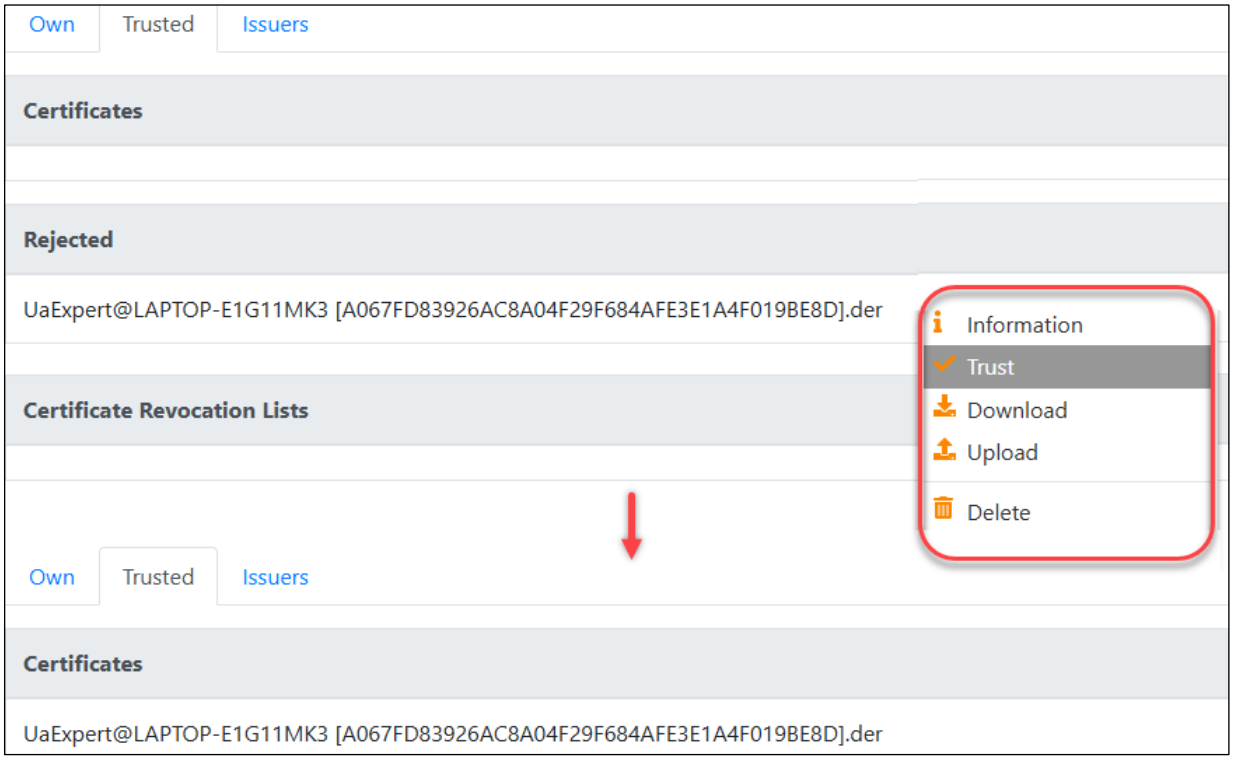
a. Select the OPC UA connection security mode. In this example, **Basic128Rsa15 – Sign (uatcp-uasc-uabinary)** is used.

b. This example uses **Username and Password** authentication. The account is **user**; please check **“Store”** and enter the password **userpw**.



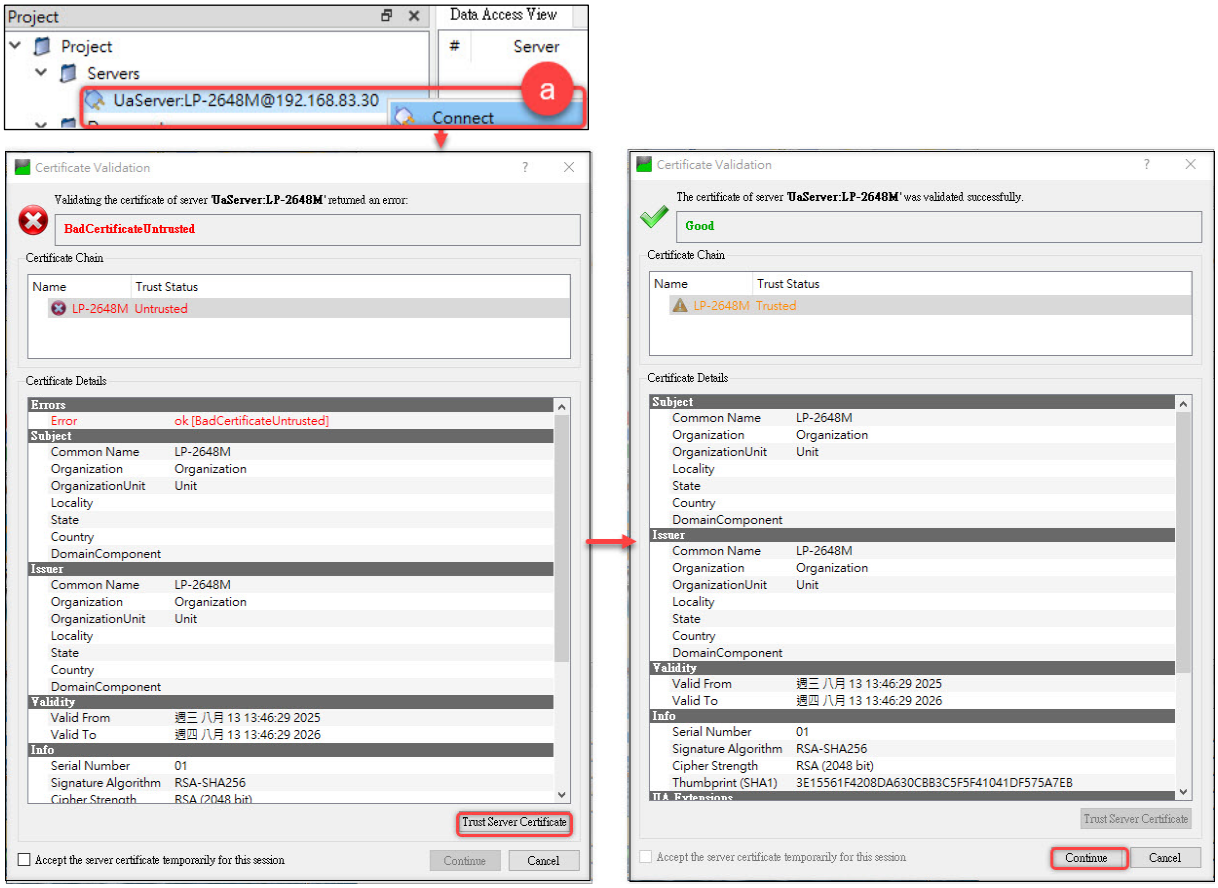
3. Set the UA Expert (Client) Certificate as Trusted

When connecting for the first time, UA Expert (Client) will send its certificate to the LP-2648M (Server). By default, this certificate is untrusted. Please log in to the LP-2648M web management interface, go to the **“Trusted”** page, and manually set this Client certificate as trusted.



Note: *If the Server and Client certificates have not changed, future connections will be trusted automatically. However, if either certificate is changed or revoked, you must manually trust it again.*

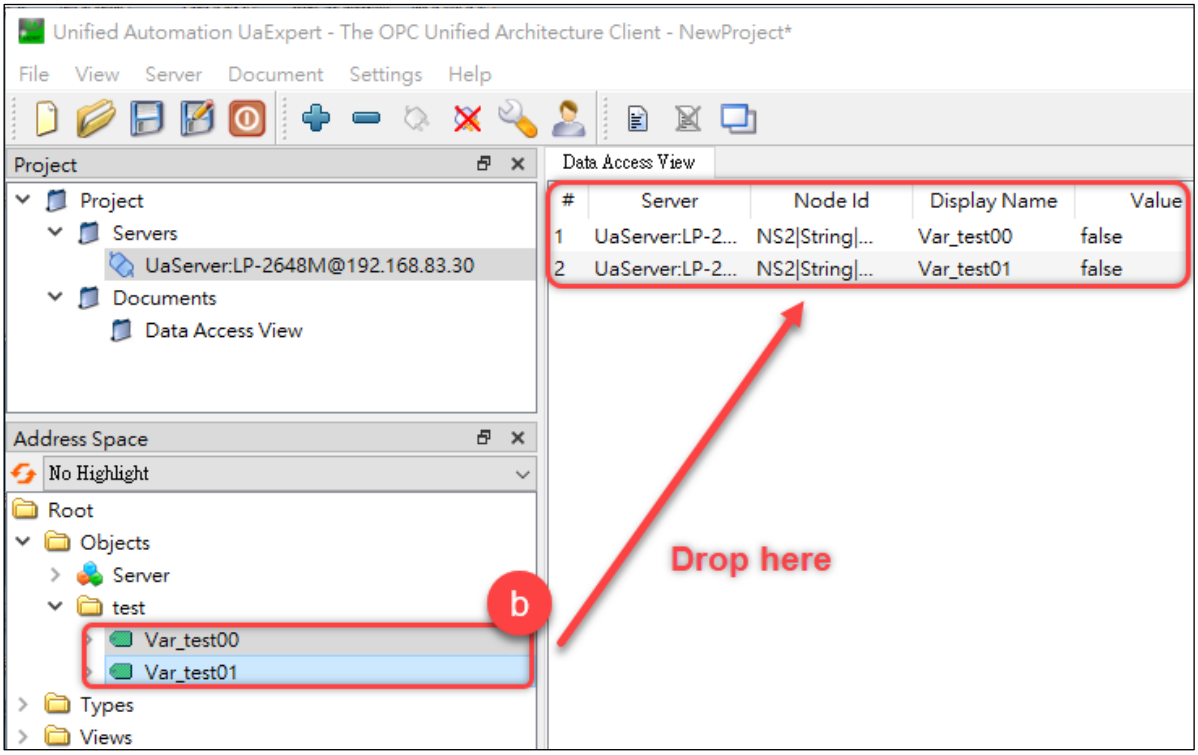
4. UA Expert Connection and Variable Binding for Monitoring



a. Right-click the Server name, then select **"Connect"**.

> When connecting for the first time, a **Certificate Validation** window will appear. Click the **"Trust Server Certificate"** button to set the Server certificate as trusted, then click the **"Continue"** button.

b. After a successful connection, drag the desired variables to be monitored into the **Data Access View** of UA Expert to complete variable binding and begin monitoring.



5. UA Expert Connection Test

Use UA Expert to establish a connection. If the variables can be successfully read and written, this confirms that the certificates have been configured correctly and are trusted.

UA Expert

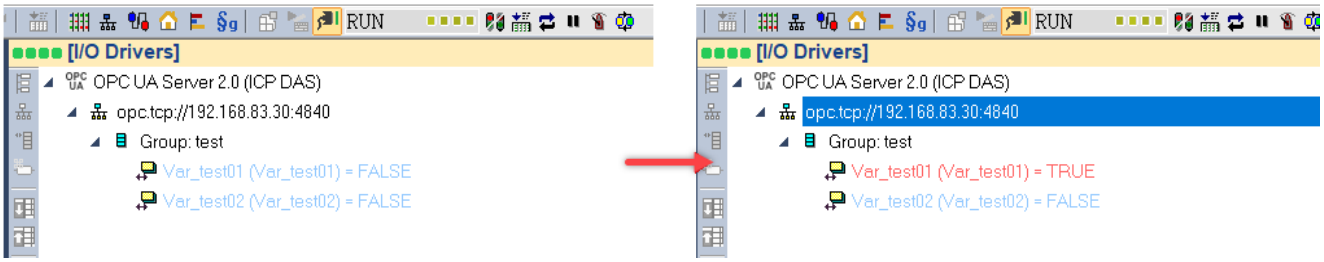
Data Access View

#	Server	Node Id	Display Name	Value	Datatype
1	UaServer:LP-2...	NS2|String|...	Var_test00	false	Boolean
2	UaServer:LP-2...	NS2|String|...	Var_test01	false	Boolean

Data Access View

#	Server	Node Id	Display Name	Value	Datatype
1	UaServer:LP-2...	NS2|String|...	Var_test00	true	Boolean
2	UaServer:LP-2...	NS2|String|...	Var_test01	false	Boolean

Win-GRAF



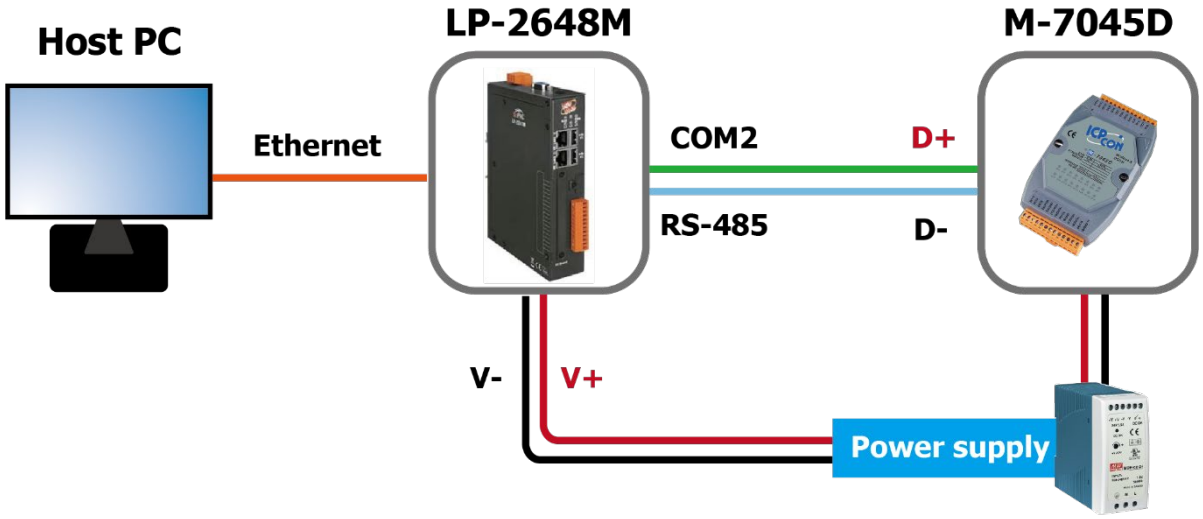
2.6 How to Set the ICP DAS Remote Module ID

This example uses the **LP-2648M** controller and **M-7045D** module to explain how to change the Net-ID of an ICP DAS Remote I/O module.

Demo Setup:

- LP-2648M: **IP**:192.168.83.30, **Mask**: 255.255.0.0, **Port**: COM2
- M-7045D: Init mode

Hardware Connection Diagram:



Please follow the steps below to modify the ICP DAS Remote module's Net-ID:

1. Download and Install the DCON Utility (PC Version)

Click the link below, or go to the ICP DAS website and search for "LP-2648M" to download the update file (New version V4308_2025_0620).

https://www.icpdas.com/en/download/show.php?num=1046&root=&model=&kw=DCON%20Utility

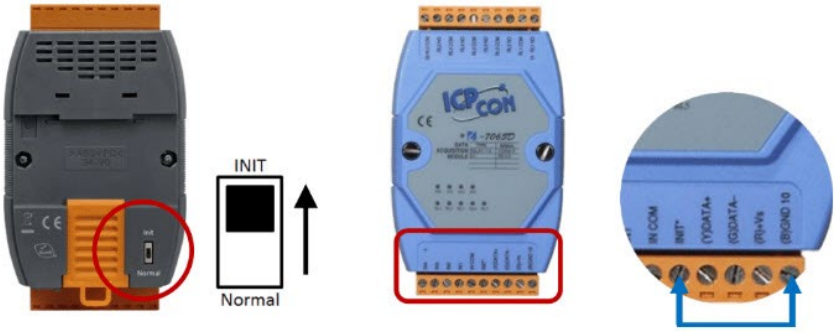
檔案名稱	版本	檔案日期	大小	備註	
DCON_Utility_Pro_PC_V4308	v4.3	2025-03-05	83.2 MB		

2. Set the LP-2648M Rotary Switch to 6 and Restart

Turn to position 6

3. Start the M-7045D in "Init" Mode

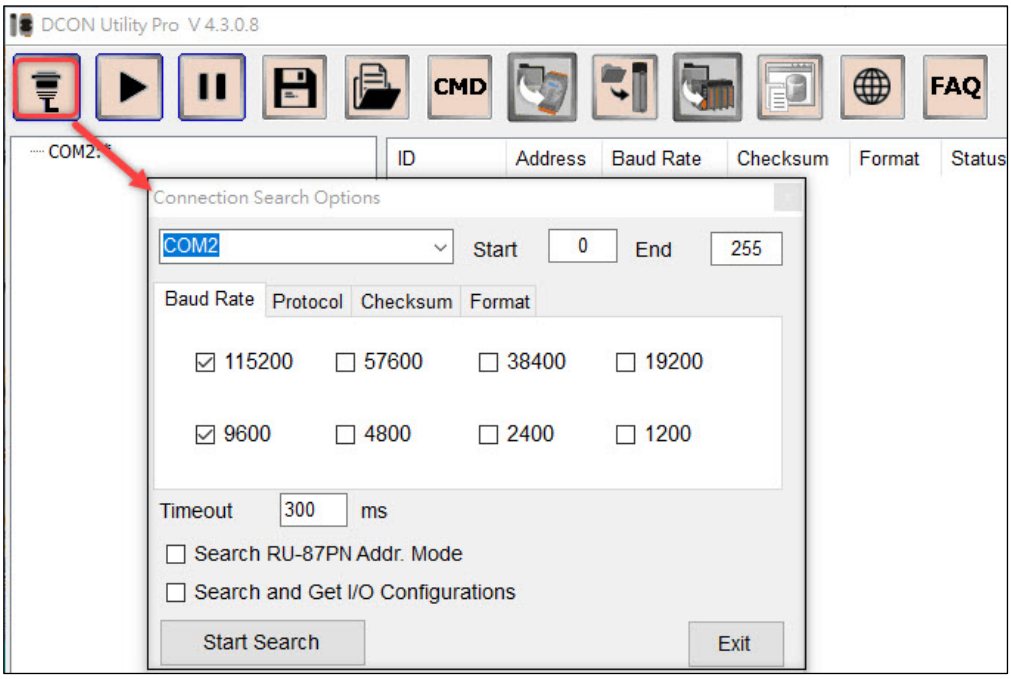
Set the module switch to **"Init"** (or connect the **"INIT*"** pin to **"GND"**), then power on the module.



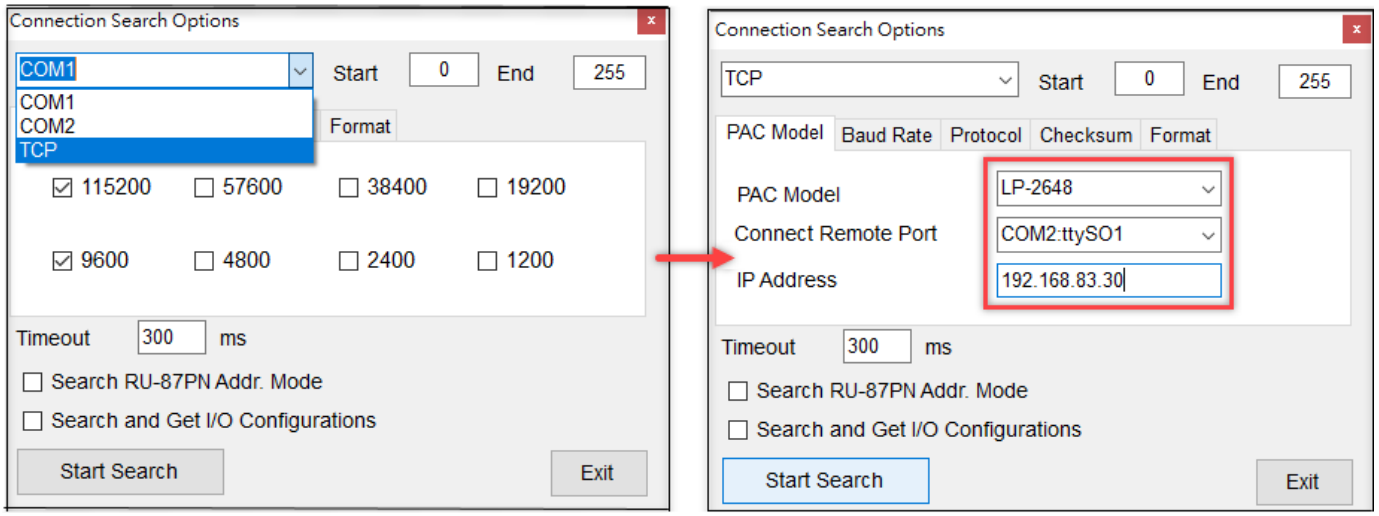
4. Search for the Module Using DCON Utility

a. Launch DCON_Utility_Pro.exe

b. Click the "Connection Options" button. The "Connection Search Options" window will appear.



c. Select **TCP** from the COM Port dropdown menu. The view will switch to the **"PAC Model"** page. Enter the required information as shown in the diagram, then click the **"Start Search"** button to begin searching for the module.

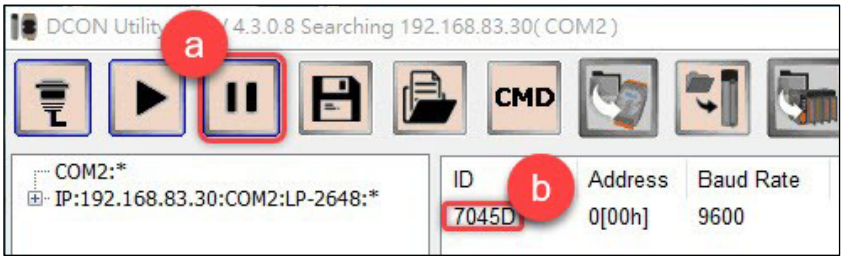


With the Connection Search Options configured, if you need to search for other ICP DAS Remote modules, simply click the **"Start Search"** button again.

5. Set the Module Net-ID

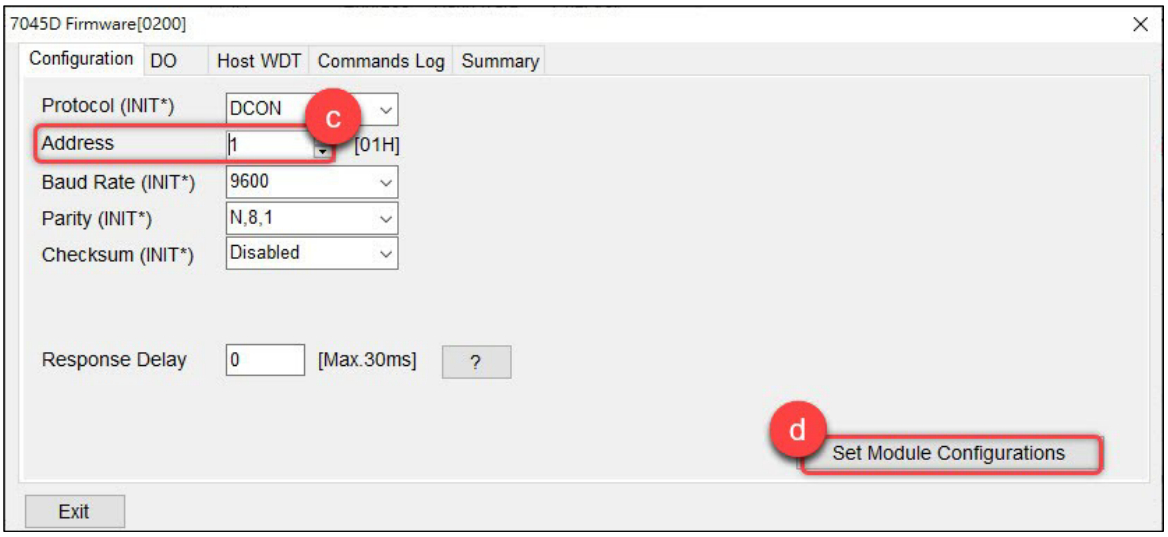
a. After the module is found, click the **"Stop Search"** button to stop searching.

b. Click on **7045D** in the ID column.

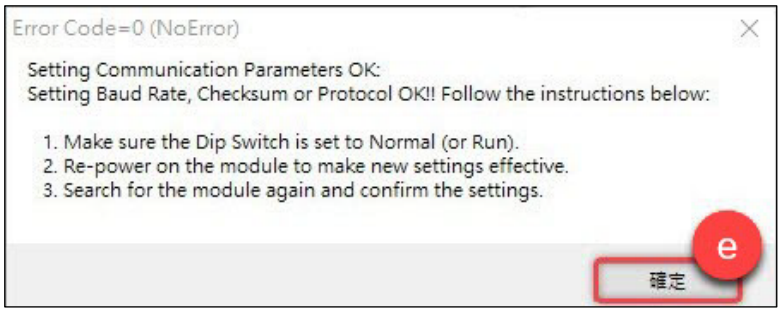


c. The **"7045D Firmware"** window will appear. Go to the "Configuration" page and change the **Net-ID** value in the **Address field**.

d. Click the **"Set Module Configurations"** button to save the settings.

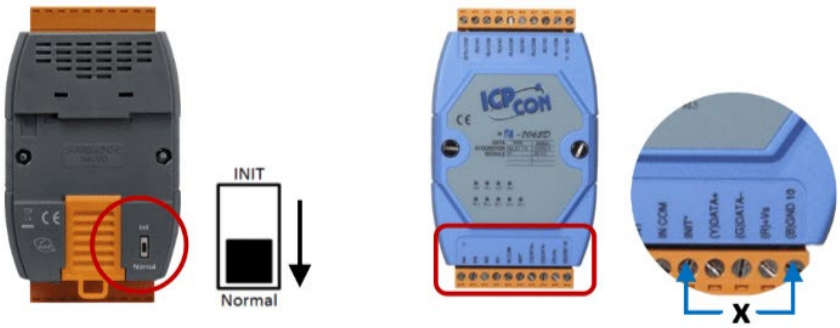


e. A confirmation window will appear. Click **"OK"** to complete the operation.



6. Switch the M-7045D Back to "Normal" Mode and Restart

Set the module switch back to **"Normal"** mode (or disconnect the **"INIT*"** and **"GND"** pins), then **restart** the module. The new settings will take effect.



※***Note:*** *After modifying the Net-ID, remember to set the module mode from **Init** to **Normal**; otherwise, the settings will not take effect.*

2.7 How to Find the LP-2648M IP Address

If the user forgets the IP address previously set in the LP-2648M web management interface, the **eSearch Utility** can be used to find the device's IP.

> ※***Note:*** *The IP address of the LP-2648M can only be changed through the web management interface and* ***cannot*** *be modified using the eSearch Utility.*

If there are multiple LP-2648M devices on the same network, please connect the LP-2648M you wish to query **directly and separately** to the PC before searching, to avoid identification confusion.

Click the link below, or search for "eSearch Utility" on the ICP DAS website to download the installation file:
https://www.icpdas.com/en/download/show.php?num=1327&nation=US&kind1=&model=&kw=esearch

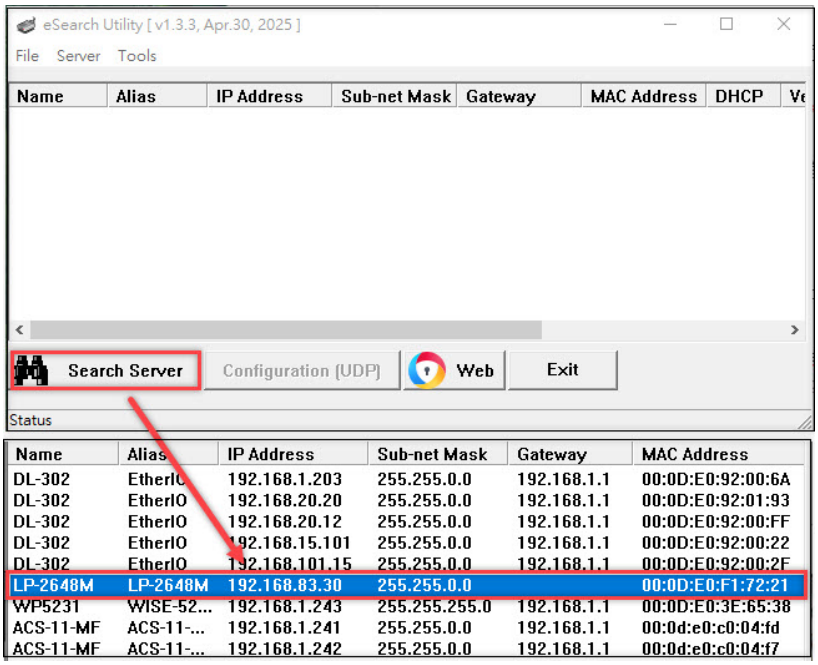
FILE NAME	VERSION	FILE DATE	SIZE	NOTE	
eSearch_v1.4.0_setup.exe	v1.4.0	2025-08-13	4.1 MB		

The eSearch Utility can be used to search for and configure ICP DAS network communication devices and I/O modules on the Ethernet network.

eSearch Utility IP Search Steps:

1. Run ”eSearch Utility “:
Double-click the "eSearch Utility" shortcut on your desktop.

2. Search using eSearch Utility:
Click the **Search Server** button at the bottom-left corner of the eSearch Utility interface to find the LP-2648M IP address.



2.8 Deleting the Win-GRAF Program on the LP-2648M

If the PLC program's operation/logic errors (e.g., infinite loops) cause the program on the LP-2648M to stop executing properly, or even make it impossible to connect with Win-GRAF (as shown below), please delete the Win-GRAF program to restore normal Runtime operation.

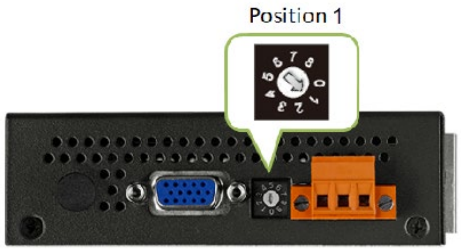
There are two methods to delete the Win-GRAF program:

- **Overwrite the original file in Safe Mode**
  Suitable when the LP-2648M is nearby and hardware operations/adjustments are convenient.

- **Use SmarTTY to connect to the LP-2648M and delete the file**
  Suitable when the LP-2648M is not on-site but can be accessed remotely over the network.

a. Overwrite the original file in Safe Mode

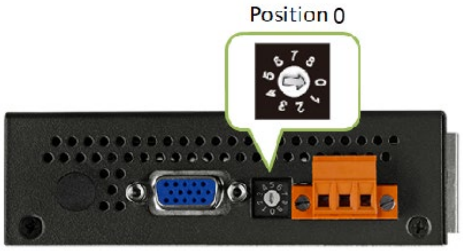
1. Set the LP-2648M Rotary switch to position 1



Mode	Description
Rotary switch: 0	Normal mode. The PAC stays in this mode during normal use.
Rotary switch: 1	Safe mode. The Win-GRAF program will not start automatically.

2. Download a blank Win-GRAF project to the LP-2648M
   On the PC's Win-GRAF Workbench, create a blank project and download it to the LP-2648M to replace the malfunctioning Win-GRAF program. (For detailed instructions, refer to Chapter 1.2.)

3. Set the LP-2648M Rotary switch to position 0



※ ***Note:*** *Remember to turn the Rotary switch back to 0 to allow the Win-GRAF program to execute normally.*

When the LP-2648M returns to normal mode, you can connect to it using Win-GRAF Workbench. After a successful connection, the Win-GRAF interface will display a normal connection status

, and you can proceed to debug the problematic PLC program.

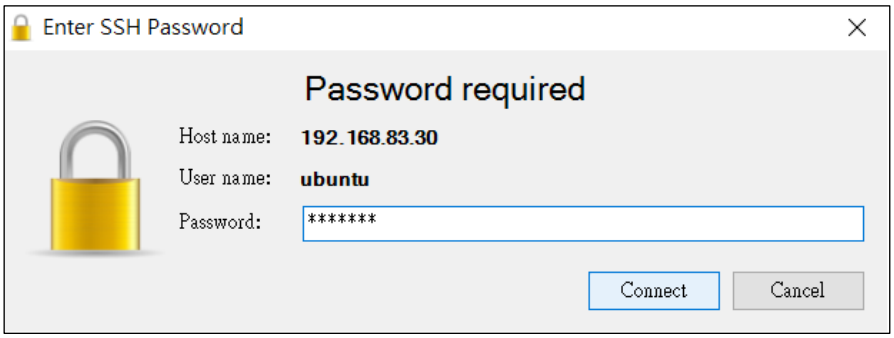
b. Use SmarTTY to connect to the LP-2648M and delete the file

Please download and install SmarTTY first. Download link: https://sysprogs.com/SmarTTY/download/
For details on connecting SmarTTY to the LP-2648M, please refer to Chapter 3.2.

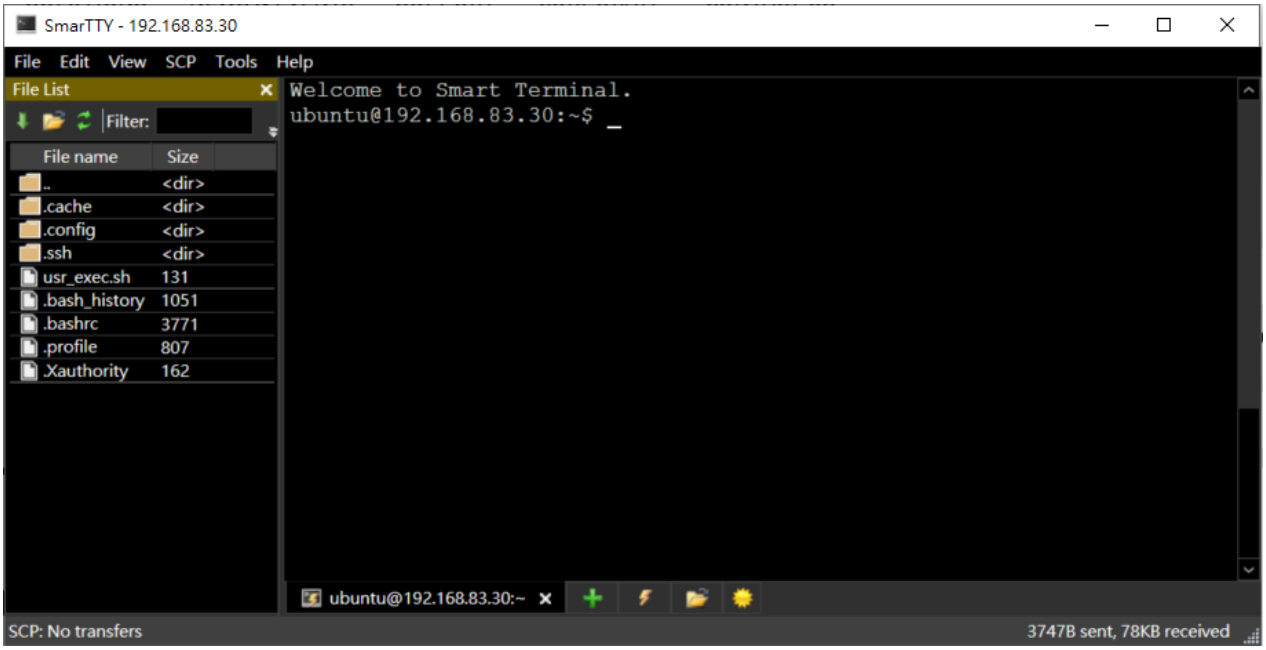
1. Log in using SmarTTY

   Enter the default username and password:

   - **Username:** ubuntu
   - **Password:** temppwd

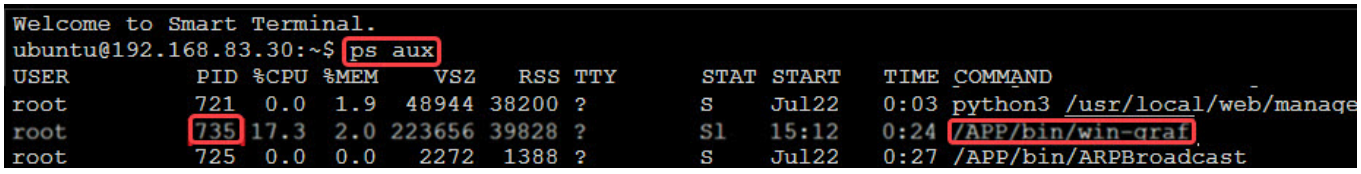


   After entering the information, the SmarTTY window will open.



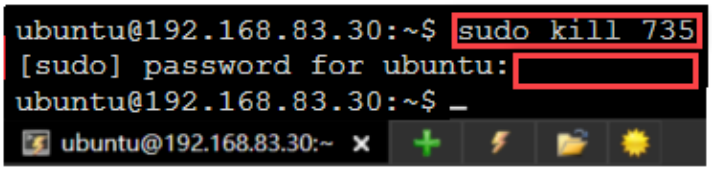
2. Search for the Win-GRAF Runtime PID

   Enter the command: ps aux in the command line. Then, in the COMMAND column, find the row corresponding to /APP/bin/win-graf. The corresponding PID number is the Win-GRAF Process ID. In the example below, the PID is **735**.



3. Stop the Win-GRAF Runtime

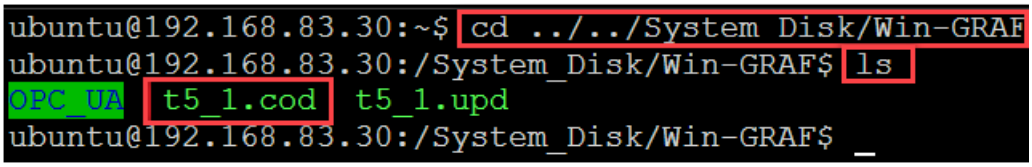
   After finding the PID (735), enter the command: sudo kill 735. The system will ask for the user password for verification. After successful verification, the Win-GRAF Runtime will be terminated.



※ ***Note:*** *When entering the password for verification, no characters will be displayed. Simply type the password and press Enter.*

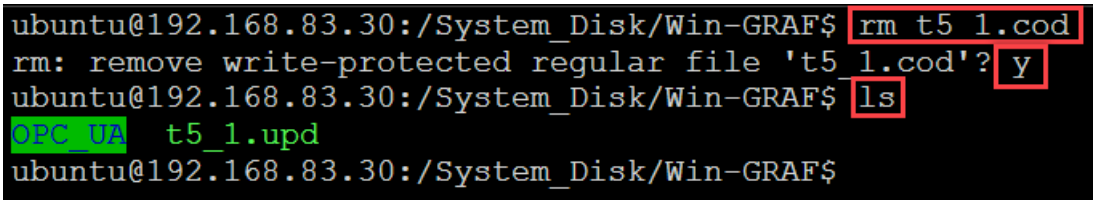
4. Find the t5_1.cod file

   Enter the command: cd ../../System_Disk/Win-GRAF to switch to the folder containing the Win-GRAF program. Then, enter the command: ls to display the t5_1.cod file.



5. Delete the t5_1.cod file

   Enter the command: rm t5_1.cod. The system will ask for confirmation. Enter y to confirm deletion. Then, enter the command: ls to verify that t5_1.cod has been successfully deleted.



6. Restart the LP-2648M

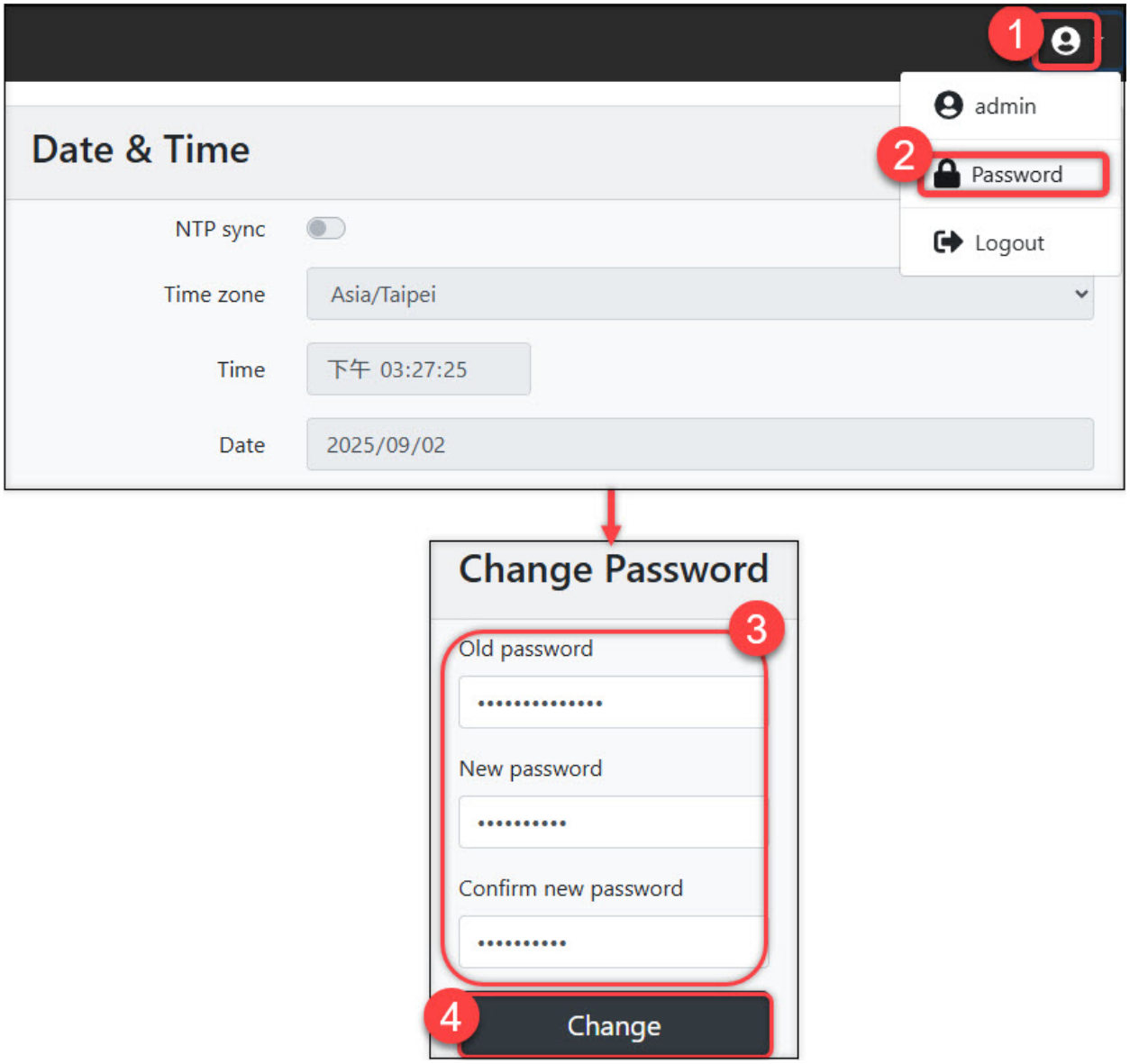
   After deleting the t5_1.cod file, enter the command: restart to reboot the LP-2648M. After restarting, the Win-GRAF Runtime on the LP-2648M will not execute any program, allowing you to debug the problematic Win-GRAF program.

2.9 Changing the LP-2648M Login Password

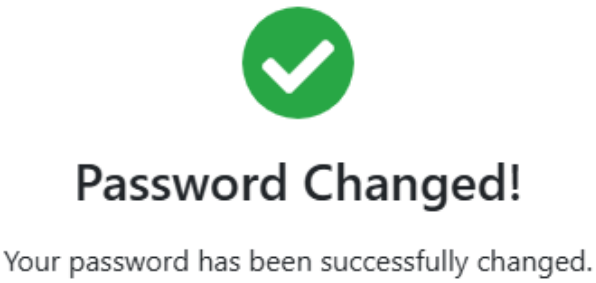
The following section describes how to change the login password through the LP-2648M web management interface.

Log in to the LP-2648M Web Management Interface

1. Click the icon in the upper-right corner of the interface
2. Click Password; the "Change Password" window will pop up.
3. Enter the new password.
4. Click the Change button to complete the password change.



After a successful change, a message window will appear notifying you that the password has been successfully changed.



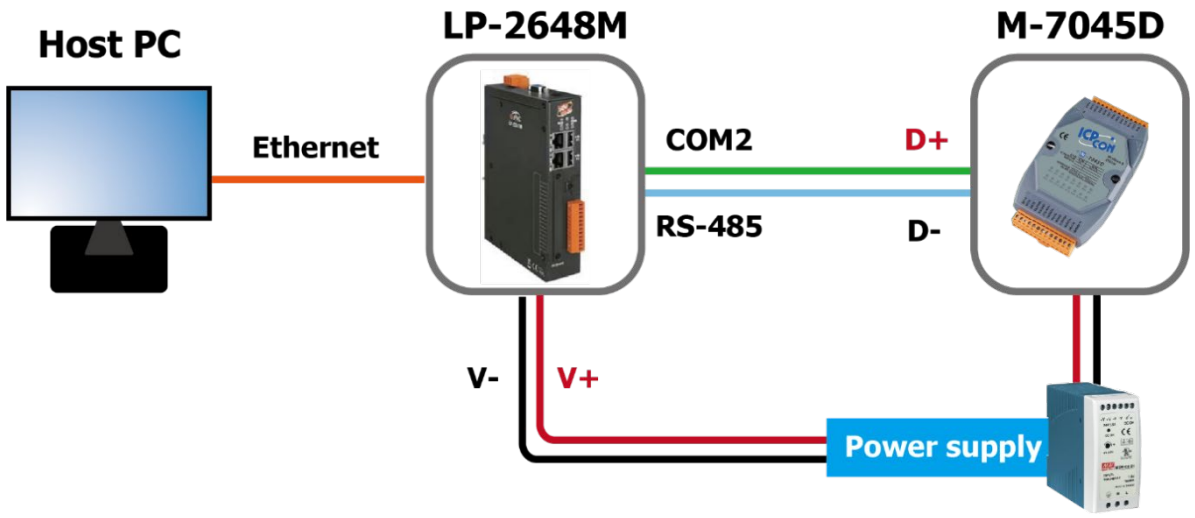
Chapter 3 — Using C Programs to Read/Write Win-GRAF Variables

This chapter explains how to use Win-GRAF's Shared Memory functionality on the LP-2648M controller to open a memory area as a shared space and bind variables to that area. Through C language applications, users can read and write data in this shared memory, enabling data exchange with Win-GRAF applications.

Example settings:

Item	Value
LP-2648M IP	192.168.83.30
Mask	255.255.0.0
Communication Port	COM2
Remote IO Module	M-7045D

Hardware Connection Diagram:



This example uses the following two demos:

Name	Execution Platform
WG_LP2648M_SM_demo	PC
LP2648M_SM_demo	LP-2648M

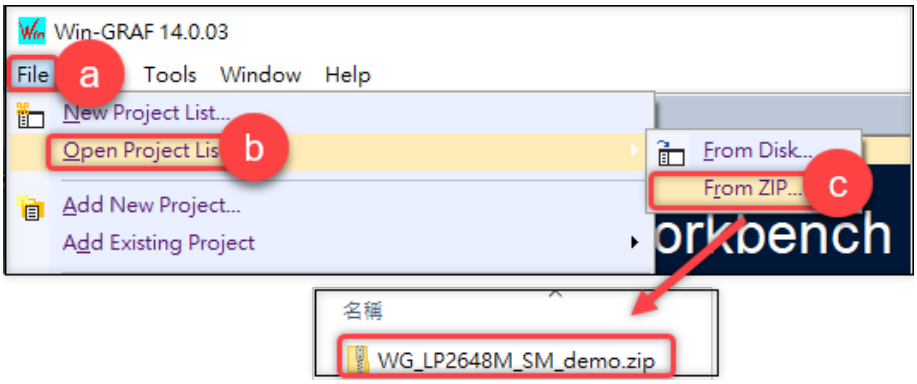
Please refer to FAQ-020 and FAQ-021 first to download the two demos above.

3.1 Making Win-GRAF Variables Available for C Programs

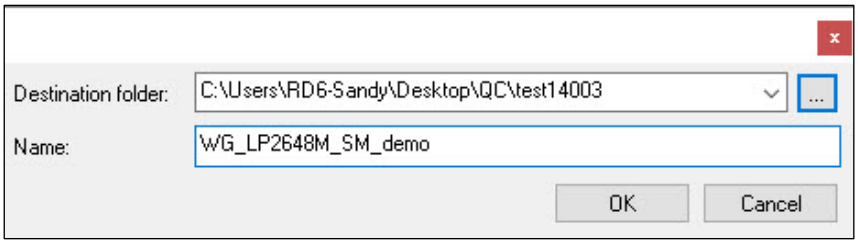
This section uses the WG_LP2648M_SM_demo project in Win-GRAF Workbench as an example to explain how to use the **Shared Memory** function in **Fieldbus** for variable binding. This demo also includes the corresponding basic ST program code, the content and purpose of which will be further explained later.

Importing the WG_LP2648M_SM_demo project:

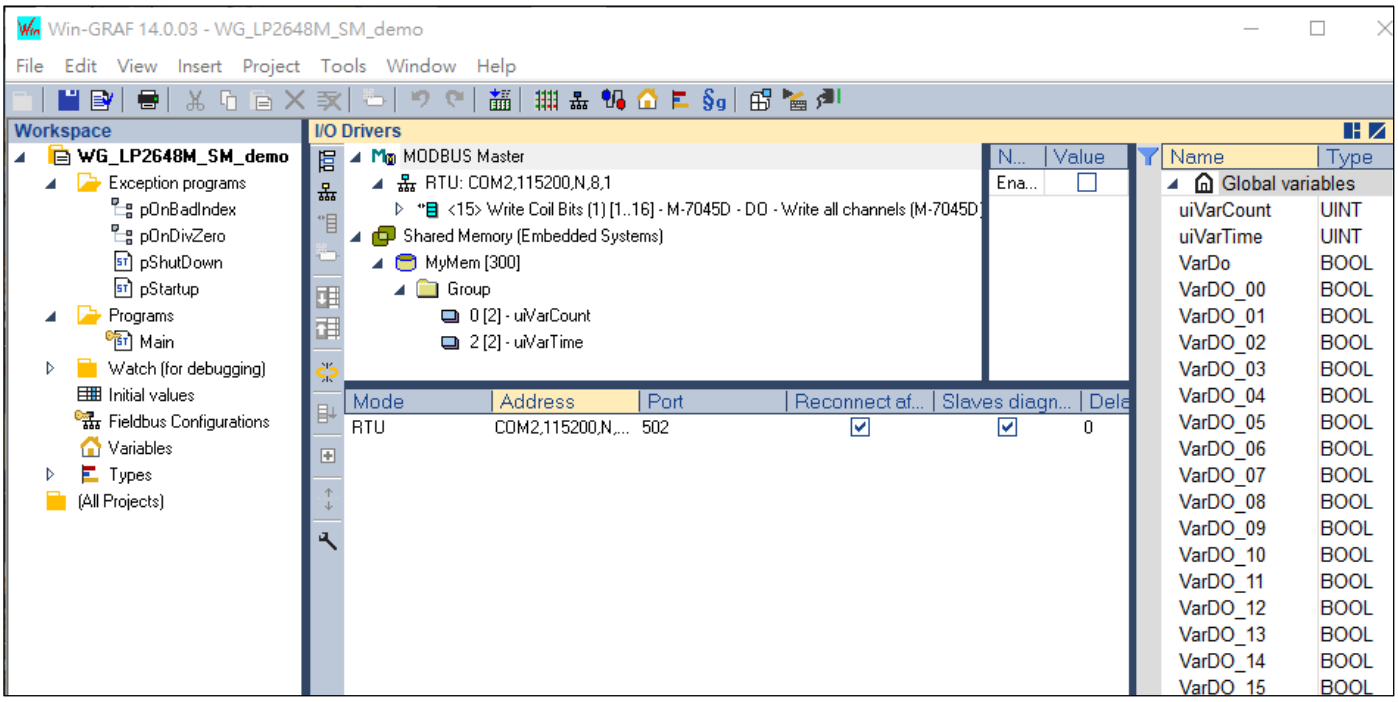
- ❖ Open Win-GRAF Workbench, click: (a) File → (b) Open Project List → (c) From ZIP...
- ❖ Select the compressed file WG_LP2648M_SM_demo.zip



- ❖ Set the project destination and file name, then click OK to create and import the project.



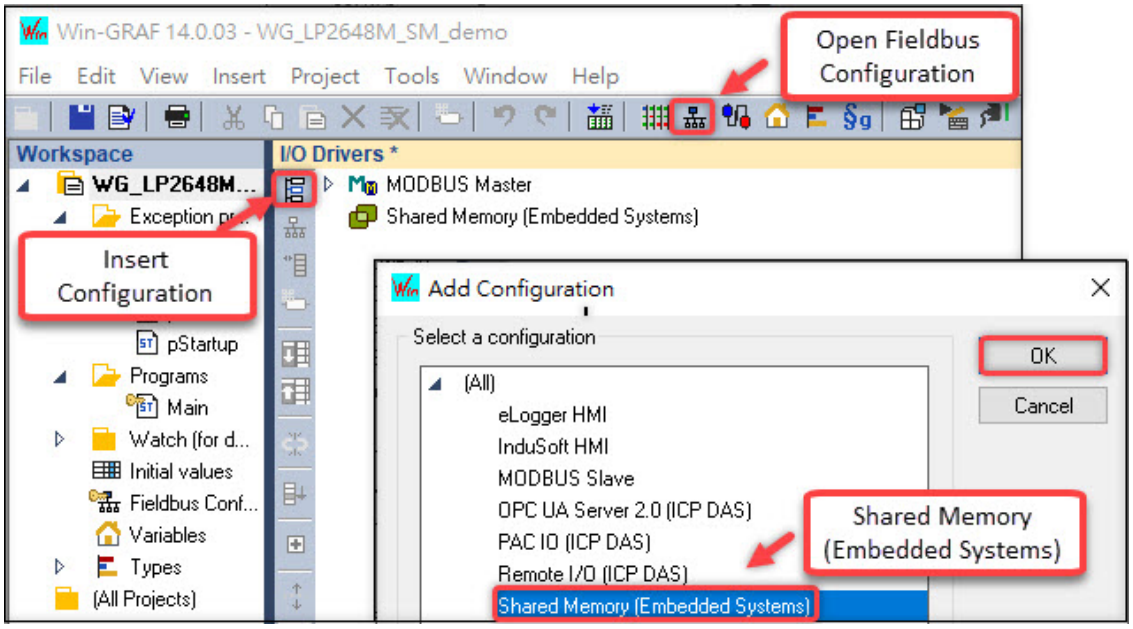
After completing the above steps, the demo project will open, as shown below:



WG_LP2648M_SM_demo Description:

1. Fieldbus – Shared Memory

Open Fieldbus Configuration →Insert Configuration →(All) > Shared Memory (Embedded Systems) > OK



- Insert Master/Port

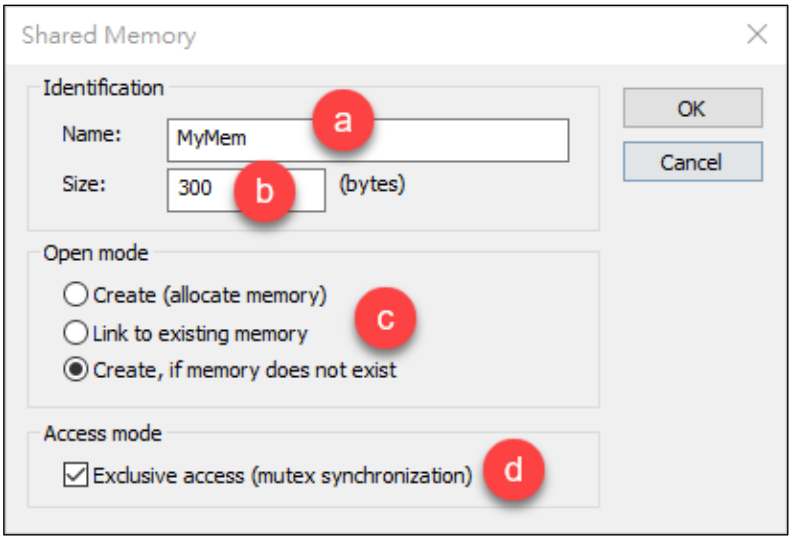
Configuring Shared Memory:

1 **Name:** Shared memory name, e.g., MyMem

2 **Size:** Define based on the total size of the variable types (BOOL, DINT, etc.). It is recommended that the size be equal to or greater than the total. Example: 300

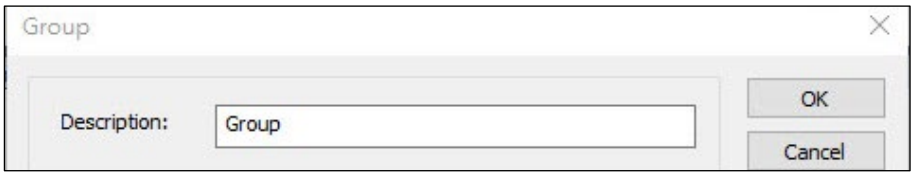
3 **Open mode:** Specifies the open mode for shared memory. Using the default value is recommended.

4 **Access mode:** "Exclusive access (mutex synchronization)" is checked by default to ensure that only one program reads/writes data at a time, preventing data errors caused by simultaneous access from multiple programs.



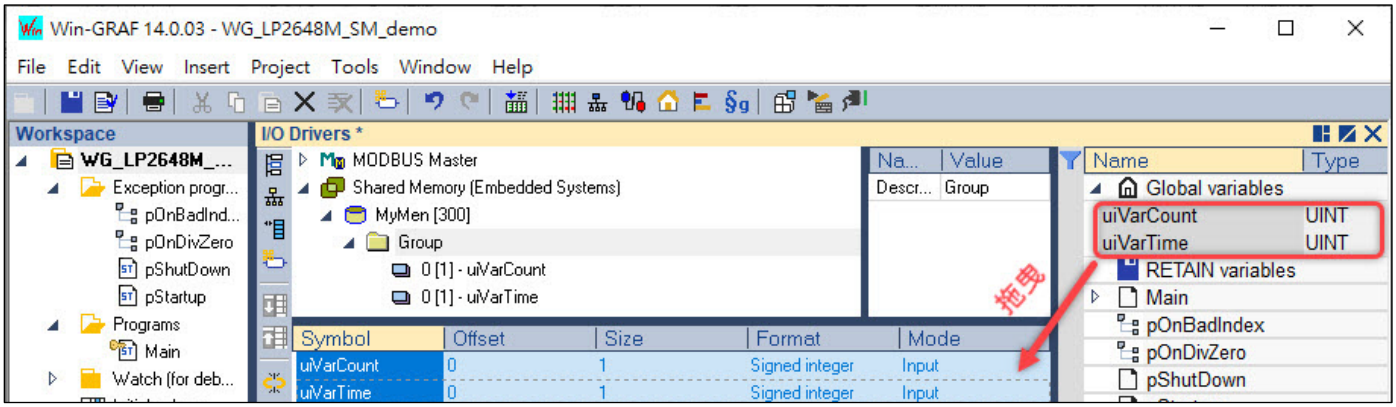
- Insert Slave Data Blocks

This example uses the default "Group" category; no modification is needed.



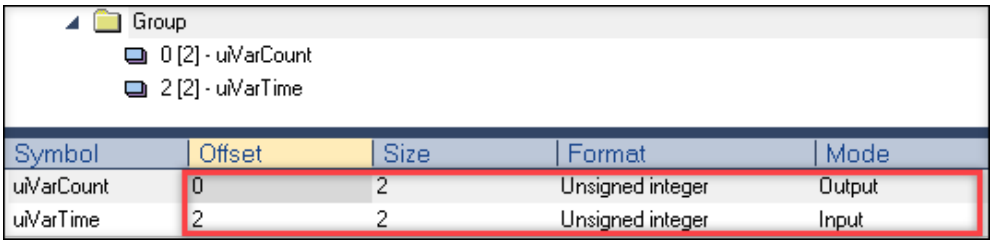
- Insert Variable

Drag the uiVarCount and uiVarTime variables to the table area to complete the variable binding. Both variables are of type UINT.



Double-click the Offset, Size, Format, or Mode fields corresponding to the variables (e.g., uiVarCount and uiVarTime) to modify the parameter settings.

After modification, the new parameter values will be displayed in real time, as shown below.



Shared Memory Variable Address Settings Description

> Variable Address: The starting address (Offset) of the variable in the Shared Memory.

> Variable Arrangement Rules:

- The address of the first variable starts from 0.
- The starting address of each subsequent variable is calculated from the starting address of the previous variable plus the memory size it occupies (in bytes).

Example:

Variable Name	Start Address (Offset)	Data Type	Bytes
uiVarCount	0	UINT	2
uiVarTime	2 (= 0 + 2)	UINT	2

Note: UINT is 16 bits and occupies 2 bytes.

2. Modbus Master RTU

In this example, the ST program controls the DO output timing of the M-7045D module via Modbus RTU.

Before use, please complete the relevant settings for the M-7045D module (see Chapter 5 of the Win-GRAF User Manual).

3. ST Program

The ST program in the demo mainly performs the following:

a. Sends the accumulated Counter value (uiVarCount) to the LP-2648M C program for display.

b. The C program receives the value (uiVarTime) and converts it into the M-7045D DO output time.

Main

```
1  // time start
2  IF bTrigger THEN
3      Tstart(tTime02);
4      bTrigger := FALSE;
5  END_IF;
6
7  //Counter
8  IF tTime02 >= t#1s THEN
9      uiVarCount := uiVarCount+1;
10     tTime02 := t#0s;
11 END_IF;
12
13 //time start 輸出Count數值給LP-2648M C程式顯示
14 if (uiVarTime > 0) AND bTrigger02 THEN
15     TSTART(tTime01);
16     bTrigger02 := FALSE;
17 END_IF;
18
19 // convert Value(LP-2648M) to time
20 tTime := any_to_time((uiVarTime*1000));
21
22 // DO action 接收LP-2648M C程式數值轉化為時間
23 IF tTime01 >= t#0s AND tTime01 < tTime THEN
24     VarDo := TRUE;
25
26 ELSIF tTime01 >= tTime AND tTime01 < (tTime * 2) THEN
27     VarDo := FALSE;
28
29 ELSIF tTime01 >= (tTime * 2) THEN
30     tTime01 := t#0s;
31 END_IF;
32
```

Please download the WG_LP2648M_SM_demo project to the LP-2648M first, then proceed with uploading and compiling the C program (LP2648M_SM_demo) according to Chapter 3.2.

3.2 Downloading and Compiling Custom C Programs

This section uses the C program LP2648M_SM_demo developed for the LP-2648M and the SmarTTY tool to demonstrate uploading and executing the program, reading and writing data through shared memory, and interacting with variables in the Win-GRAF project.

SmarTTY is an SSH client connection tool. The following operations will be performed in a Windows environment, connecting to the LP-2648M via SmarTTY for program uploading and compilation.

Please download and install SmarTTY first: https://sysprogs.com/SmarTTY/download/

LP2648M_SM_demo Setup and Instructions

1. Connect to the LP-2648M via SmarTTY

a. Click the "New SSH Connection" option.

b. Enter the following information:

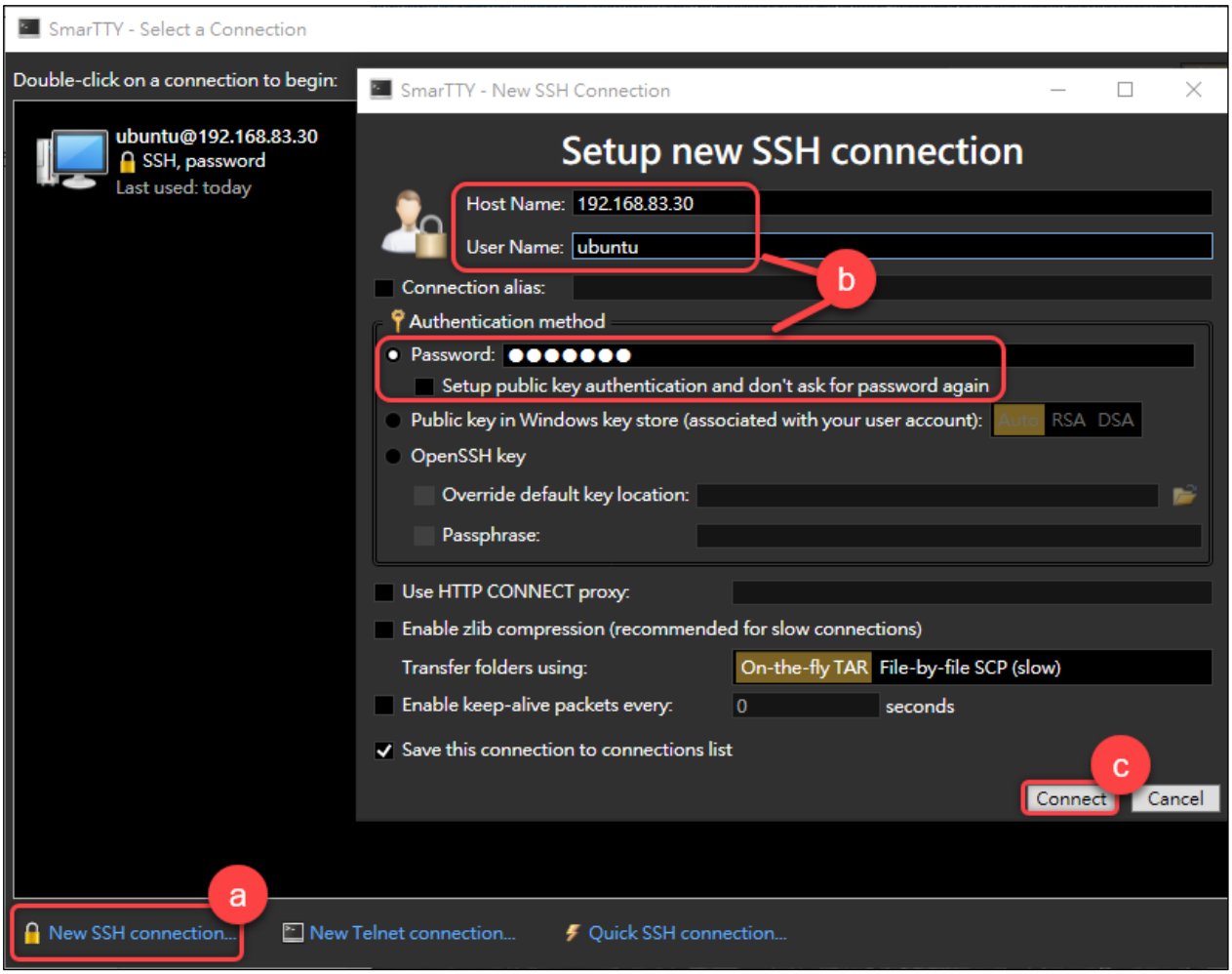
Host Name: 192.168.83.30

User Name: ubuntu

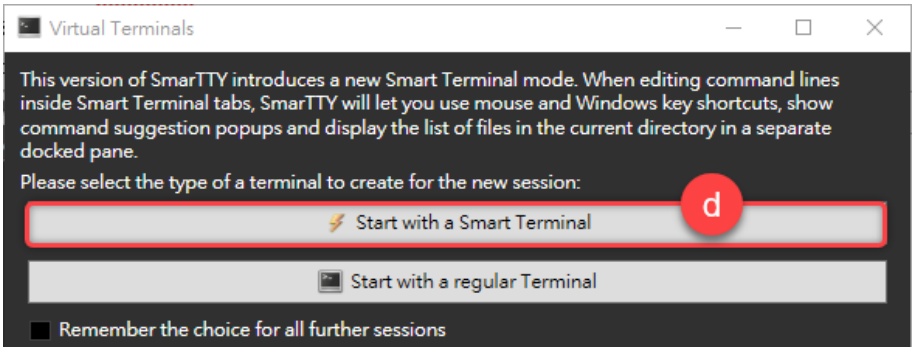
Password: temppwd

Uncheck "Setup public key"

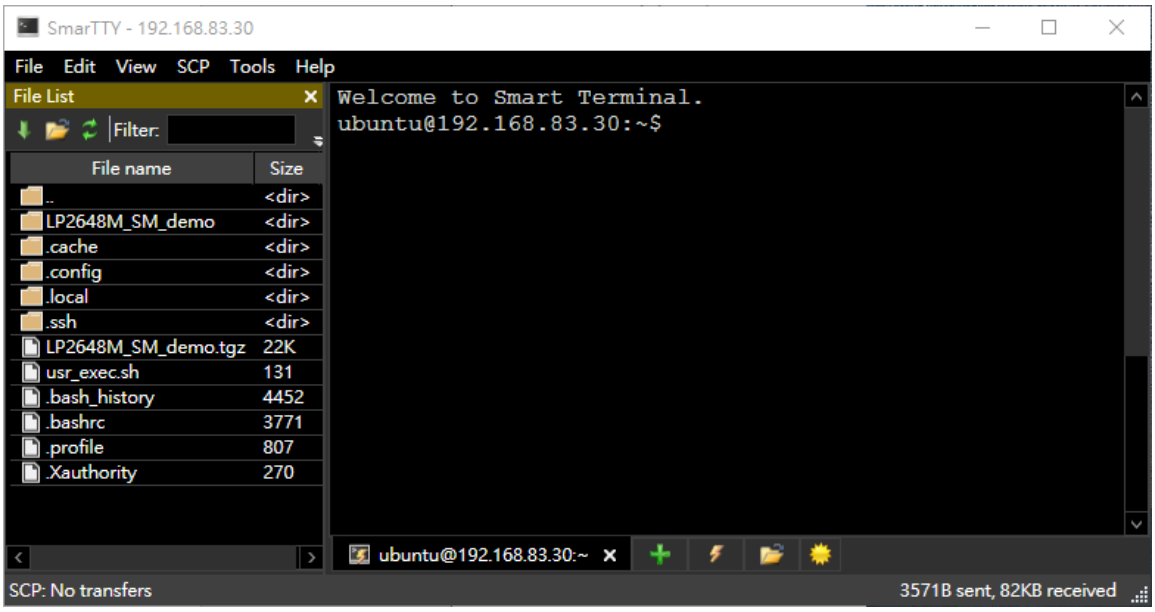
c. Click the "Connect" button.



d. Click the "Start with a Smart Terminal" button.



A successful connection will display the following screen.

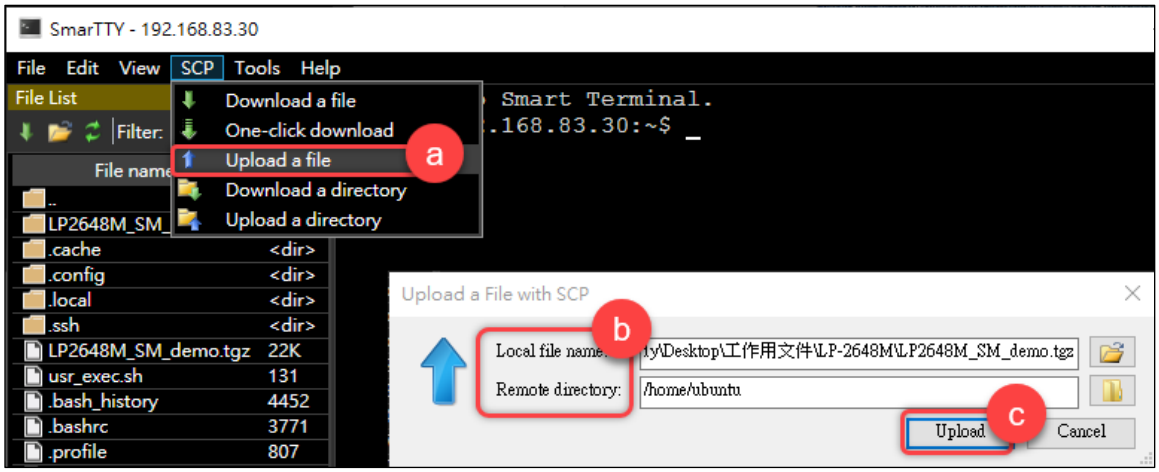


2. Upload the Program

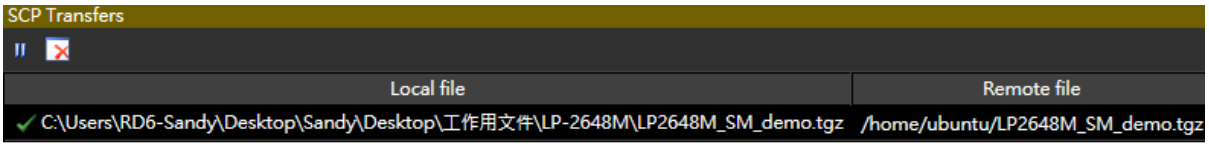
a. Click SCP → Upload a file

b. Select the file and the file destination

c. Click the "Upload" button



If the file is uploaded successfully, the following screen will appear.



√ means uploaded successfully

3. Extract LP2648M_SM_demo.tgz

Use the command: **tar -zxvf ./LP2648M_SM_demo.tgz** to extract the file.

```
Welcome to Smart Terminal.
ubuntu@192.168.83.30:~$ tar -zxvf ./LP2648M_SM_demo.tgz
./LP2648M_SM_demo/
./LP2648M_SM_demo/LP2648M_SM_demo.c
./LP2648M_SM_demo/Makefile
./LP2648M_SM_demo/lib/
./LP2648M_SM_demo/lib/Quicker.a
./LP2648M_SM_demo/inc/
./LP2648M_SM_demo/inc/Quicker.h
./LP2648M_SM_demo/LP2648M_SM_demo
ubuntu@192.168.83.30:~$ _
```

4. Compile

a. Use the command: **cd LP2648M_SM_demo** to move to the LP2648M_SM_demo directory.

b. Use the command: **make** to build the program.

(If entering **make** shows **Nothing to be done for 'all'**，it means the program has already been compiled and built, and no files have changed, so recompilation is unnecessary. Proceed with the next steps.)

```
ubuntu@192.168.83.30:~$ cd LP2648M_SM_demo
ubuntu@192.168.83.30:~/LP2648M_SM_demo$ make
gcc -I./ -I./inc -o LP2648M_SM_demo  LP2648M_SM_demo.c ./l
ib/Quicker.a -lm ./lib/Quicker.a -lm  -pthread
ubuntu@192.168.83.30:~/LP2648M_SM_demo$ ls
LP2648M_SM_demo  LP2648M_SM_demo.c  Makefile  inc  lib
ubuntu@192.168.83.30:~/LP2648M_SM_demo$ _
```

5. Execute the Program

※ ***Note:*** *Please download the Win-GRAF WG_LP2648M_SM_demo to the LP-2648M first before performing the following operations.*

Use the command **./LP2648M_SM_demo** to run the program.

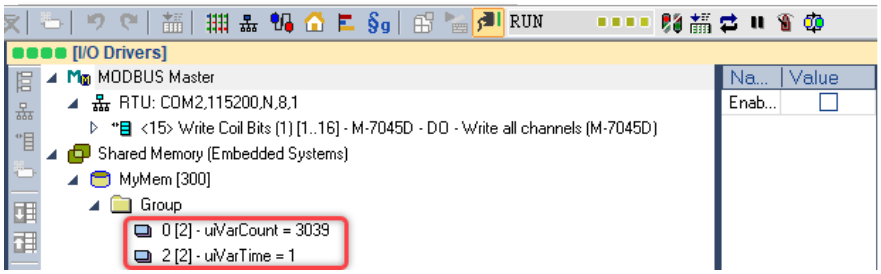
a. **Demo Usage Description**

b. **Count:** Displays the value of the Win-GRAF demo variable uiVarCount. (In this demo, the displayed value updates automatically every 5 seconds.)

value: Displays the value output to uiVarTime.

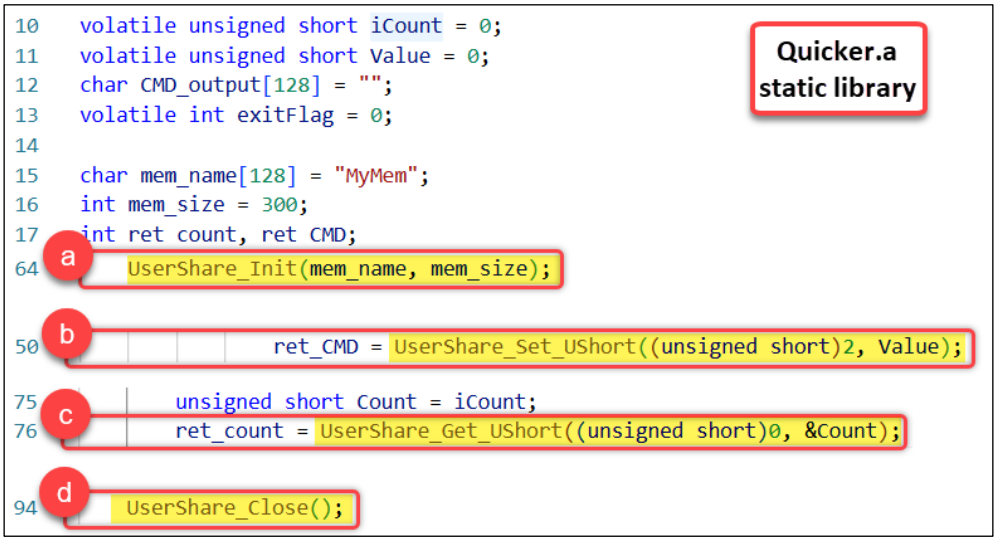
```
/*********************Demo description**********************/
This is a LP-2648M Shared Memory demo
Count displays the Counter from the project variable: uiValueCount.
Value shows the DO cycle time set by you.
Please enter a value to set DO cycle time(s), ex: 1, which means 1 second.
The program refreshes every 5 seconds.
Type exit to terminate the progrme.
/*********************Demo description**********************/

Count: 3039
value: 1(s)

Please enter a value, integer or exit
_
```

Please enter a value, integer or exit: Enter a value to output to uiVarTime. Enter exit to terminate the program.

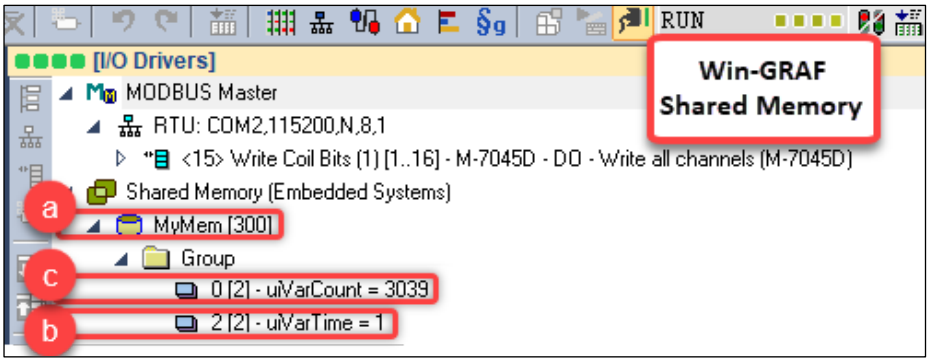


6. Program Description

LP2648M_SM_demo uses the Quicker.a static library to implement the Shared Memory application.



The Quicker.a static library corresponds to Win-GRAF's Shared Memory function, as shown below:



API used in the demo:

a. **void UserShare_Init(char *mmap_name, int mmap_size)**

Connects to the shared memory according to the Win-GRAF Shared Memory name (MyMem) and size (300 bytes).

b. **unsigned char UserShare_Set_UShort(unsigned short iUserAddress, unsigned short iStatus)**

Writes an unsigned short value to the Win-GRAF demo bound variable uiVarTime.

c. **unsigned char UserShare_Get_UShort(unsigned short iUserAddress, unsigned short *iStatus)**

Reads an unsigned short value from the Win-GRAF demo bound variable uiVarCount.

d. **void UserShare_Close(void)**

Ends the use of shared memory.

Quicker.a API Description:

❖ Quicker.a provides users with various functions for operating Win-GRAF variable data, including:

- Connect/Disconnect Shared Memory
- Read/Write Boolean
- Read/Write 8-bit, 16-bit, 32-bit, or 64-bit Integer
- Read/Write 32-bit or 64-bit REAL
- Read/Write up to 256 Characters

❖ **Connect/Disconnect Shared Memory:**

a. void UserShare_Init(char *mmap_name, int mmap_size);

- mmap_name: The shared memory name set in Win-GRAF Shared Memory.
- mmap_size: The shared memory size set in Win-GRAF Shared Memory.

b. void UserShare_Close(void);

- Call this function before the program ends.

● **Shared Memory API Write/ Read Mapping Table**

API Type	Win-GRAF Type	Data Size	API Name
Write (Set)	BOOL	8 bits	unsigned char UserShare_Set_Coil (unsigned short iUserAddress, unsigned char iStatus);
	INT	16 bits	unsigned char UserShare_Set_Short (unsigned short iUserAddress, short iStatus);
	UINT	16 bits	unsigned char UserShare_Set_UShort (unsigned short iUserAddress, unsigned short iStatus);
	LINT	64 bits	unsigned char UserShare_Set_Int64 (unsigned short iUserAddress, long long iStatus);
	ULINT	64 bits	unsigned char UserShare_Set_UInt64 (unsigned short iUserAddress, unsigned long long iStatus);
	DINT	32 bits	unsigned char UserShare_Set_Long (unsigned short iUserAddress, long iStatus);
	UDINT	32 bits	unsigned char UserShare_Set_ULong (unsigned short iUserAddress, unsigned long iStatus);
	SINT	8 bits	unsigned char UserShare_Set_Char (unsigned short iUserAddress, char iStatus);
	USINT	8 bits	unsigned char UserShare_Set_UChar (unsigned short iUserAddress, unsigned char iStatus);
	REAL	32 bits	unsigned char UserShare_Set_Float (unsigned short iUserAddress, float iStatus);

	LREAL	64 bits	unsigned char UserShare_Set_Double (unsigned short iUserAddress, double iStatus);
	STRING	256 bits or customizable	int UserSetReg_Str (unsigned short iUserAddress, char iStatus, unsigned short len);
API Type	**Win-GRAF Type**	**Data Size**	**API Name**
Read (Get)	BOOL	8 bits	unsigned char UserShare_Get_Coil (unsigned short iUserAddress, unsigned char *iStatus);
	INT	16 bits	unsigned char UserShare_Get_Short (unsigned short iUserAddress, short *iStatus);
	UINT	16 bits	unsigned char UserShare_Get_UShort (unsigned short iUserAddress, unsigned short *iStatus);
	LINT	64 bits	unsigned char UserShare_Get_Int64 (unsigned short iUserAddress, long long *iStatus);
	ULINT	64 bits	unsigned char UserShare_Get_UInt64 (unsigned short iUserAddress, unsigned long long *iStatus);
	DINT	32 bits	unsigned char UserShare_Get_Long (unsigned short iUserAddress, long *iStatus);
	UDINT	32 bits	unsigned char UserShare_Get_ULong (unsigned short iUserAddress, unsigned long *iStatus);
	SINT	8 bits	unsigned char UserShare_Get_Char (unsigned short iUserAddress, char *iStatus);
	USINT	8 bits	unsigned char UserShare_Get_UChar (unsigned short iUserAddress, unsigned char *iStatus);
	REAL	32 bits	unsigned char UserShare_Get_Float (unsigned short iUserAddress, float *iStatus);
	LREAL	64 bits	unsigned char UserShare_Get_Double (unsigned short iUserAddress, double *iStatus);
	STRING	256 bits or customizable	int UserGetReg_Str (unsigned short iUserAddress, char *iStatus, unsigned short len);

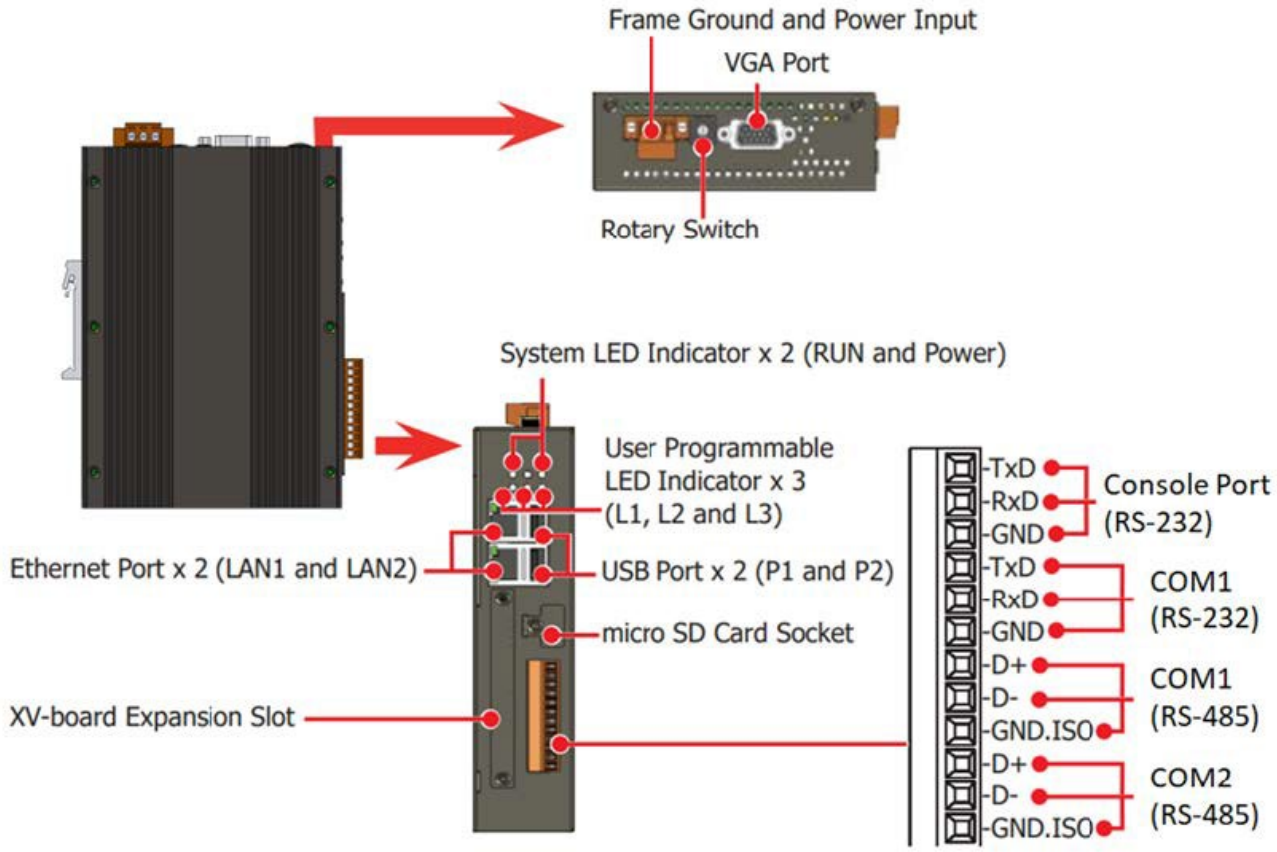
❖ **In the APIs, iUserAddress represents the Win-GRAF Offset address.**

Appendix A. LP-2648M Hardware Specifications

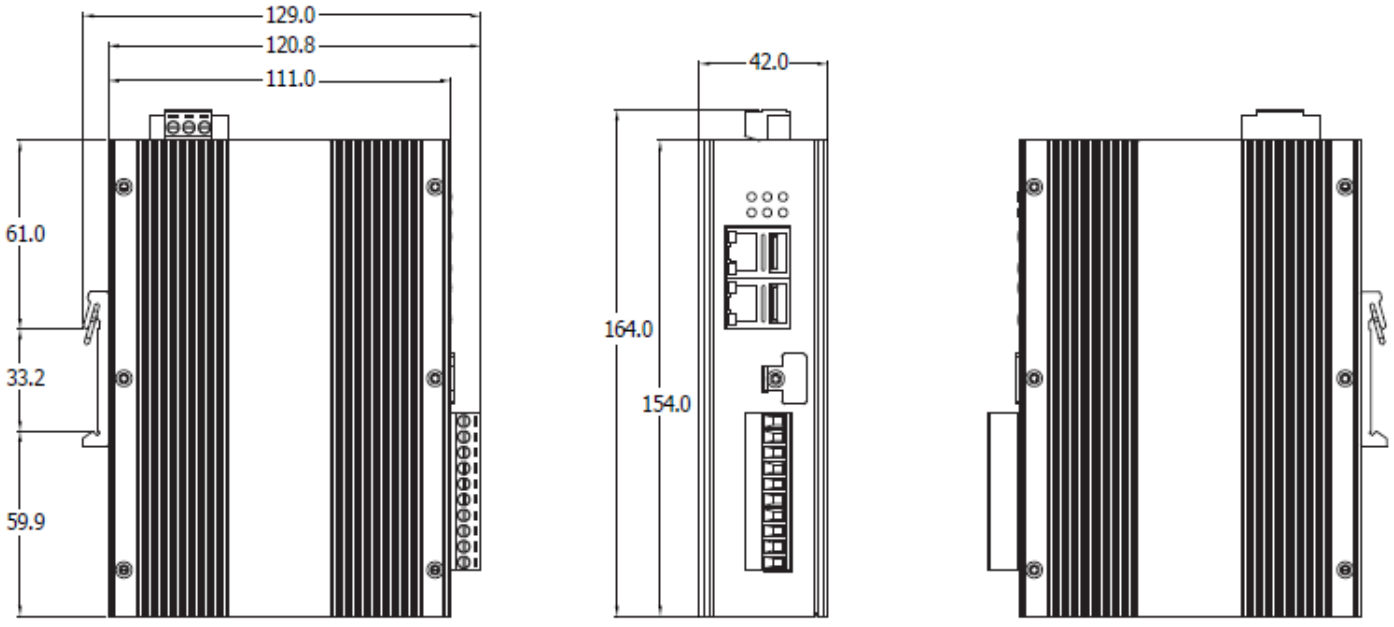
● Hardware Specifications

Item	LP-2648M
CPU Module	
Processor (CPU)	Cortex-A53, 1.4 GHz, Quad-core Processor
DDR3 SDRAM	2 GB
Flash	8 GB eMMC
MRAM	128 KB
FRAM	64 KB (available for retain variables)
Expandable Memory	4 GB microSD card (supports up to 32 GB)
Real-Time Clock (RTC)	Read/Write year, month, day, hour, minute, second; provides day-of-week information
64-bit Hardware Serial Number	Yes, for Software Copy Protection
Dual Watchdog	Yes
LED Indicators	1 x System, 1 x Power, 2 x Programmable, 1 x Redundancy
Rotary Switch	Yes, 1 x 10 Position (0 ~ 9)
VGA & Communication Interfaces	
Ethernet	2 x RJ-45, 10/100/1000 Base-TX (Auto-negotiation, Auto MDI/MDI-X, LED indicators)
USB 2.0 (host)	2
Console	RS-232 (RxD, TxD, GND); Non-isolated
COM 1	RS-232 (RxD, TxD, GND); 2500 VDC isolation
COM 2	RS-485 (Data+, Data-); 2500 VDC isolation
COM 3	RS-485 (Data+, Data-); 2500 VDC isolation
Mechanical	
Casing	Metal
Dimensions (W x L x H)	42 mm x 164 mm x 129 mm
Ingress Protection Rating	IP30 (Aluminum)
Installation	DIN-Rail Mounting
Environmental	
Operating Temperature	-25 ~ +75 °C
Storage Temperature	-40 ~ +80 °C
Relative Humidity	10 ~ 90% RH (Non-condensing)
Power	
Input Range	+12 ~ 48 VDC
Power Consumption	7.2 W (0.3 A @ 24 VDC)

Hardware Interface Diagram



Hardware Dimension Diagram



Left Side View | Front View | Right Side View

Appendix B. References

- Win-GRAF User Manual
- LP-2648M Update File
- UA Expert
- DCON Utility PC version
- eSearch Utility
- SmarTTY
- LP-2648M Data sheet
- FAQ-020
- FAQ-021