DELTA PLC
Starter Kit Manual

UT-AS332-C

Smarter. Greener. Together.

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Chapter 1 Introduction of UT Series Starter Kits

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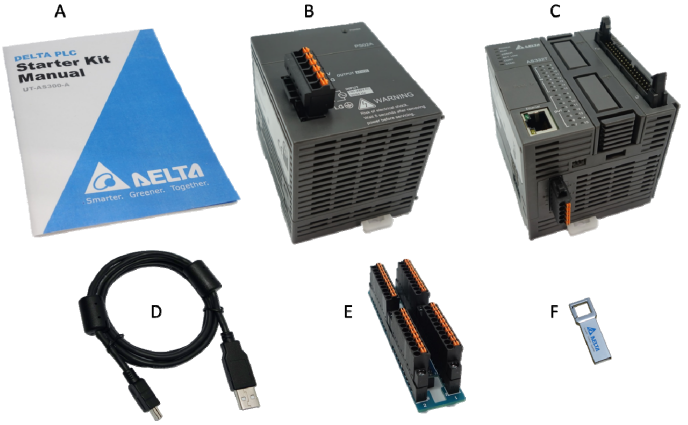
1.1 General Information about UT Series Starter Kits

This UT series starter kit simplifies users' entry into the world of Delta PLCs and helps the users get familiar with programming software.

For that purpose, this manual explains how to connect the components of a starter kit, and how to program the PLC by means of several simple examples.

UT- AS332-C Starter Kits:

- Components of the UT- AS332-C starter kit:



Item	Model name	Description
A	Starter Kit Manual	User manual
B	AS-PS02A	Power supply module, 24 V DC output Input: 100~240 VAC, 50/60 Hz Output: 24VDC/1.5A, 36W (for PLC internal use) Output: 24VDC/0.5A, 12W (for external use)
C	AS332T-A	CPU with 32 built-in I/O points CPU module NPN output

Item	Model name	Description
		1x Ethernet port 2x RS-485 ports 1x USB port 1x Micro SD interface 2x function cards (optional) supporting 32 I/Os (16DI+16DO) and up to 1024 I/Os the program capacity:128K steps
D	UC-PRG015-01A (1.5 m)	Programming cable for a PLC
E	UB-10-IO32D	I/O board
F	UT-USB01	USB flash drive

- USB flash drive:

Item	Contents
Software	1. ISPSoft 2. COMMGR
Manual	1. Starter Kit Manual 2. ISPSoft User Manual 3. AS300 Quick Start 4. AS300 Programming Manual 5. AS300 Operation Manual 6. AS300 Hardware Manual 7. AS300 Module Manual 8. Instruction Sheet (ASPS02) 9. Instruction Sheet (AS332T-A)
Program	1. Example

- Starter kit setup wizard:

(1) Insert the USB flash drive which is an attachment to a UT series starter kit into a computer, and double-click “StarterKit.exe” in the USB flash drive.

(2) There are three options.

❶ Install Software

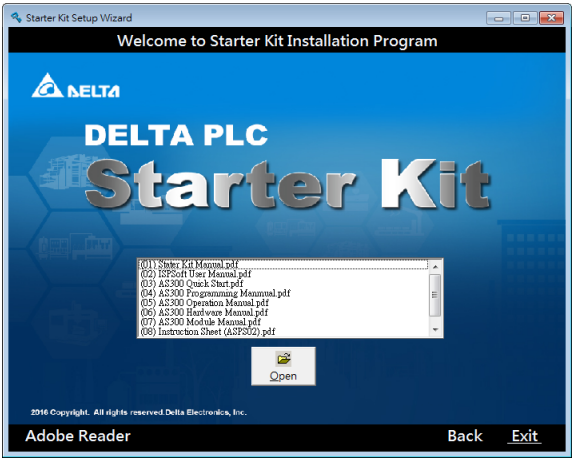
After users click **Install Software**, they can select the software which needs to be installed.

(A) ISPSoft version x.xx: PLC programming software

(B) COMMGR version x.xx: Communication management software

❷ Review Documentation

After users click **Review Documentation**, they can select the manual that they want to read from the list box displayed, and then click **Open** to open the manual.



❸ Browse Examples

After users click **Browse Examples**, they can choose to open a PLC application example according to their needs.

1.2 System Requirements for a Starter Kit

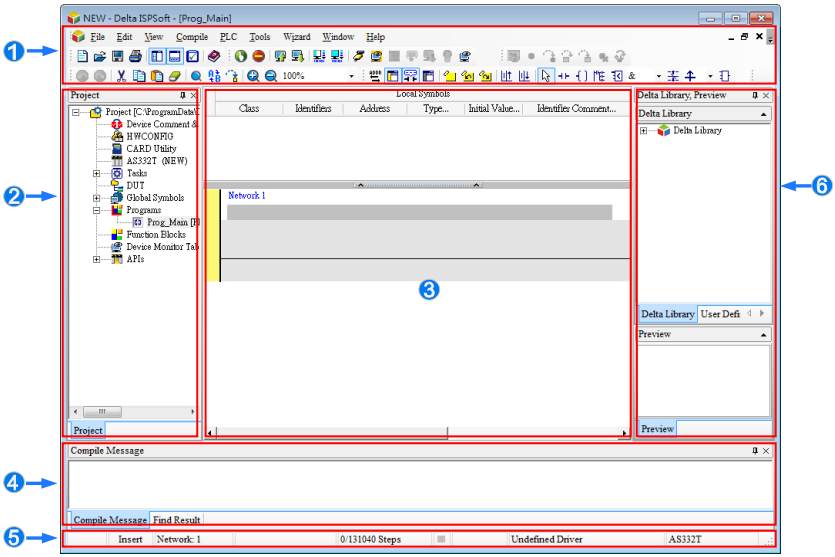
Before using a starter kit, users have to make sure that an operating system meets the requirements below.

Item	System requirement
Operating system	Windows XP/Vista/7/8/10
CPU	Pentium 1.5 G or above
Memory	256 MB or above (A memory having a capacity of 512 MB or above is recommended.)
Hard disk drive	Capacity : 500MB or above
Monitor	Resolution: 800×600 pixels or above (Recommended setting: 1024x768/96 dpi)
Keyboard/Mouse	General keyboard/mouse, or device compatible with Windows
Printer	Printer with a driver for Windows (It is used to print projects, and is optionally required.)
Communication software	COMMGR, a communication manager, must be installed on a computer. (*1)

***1. Please refer to ISPSoft User Manual for more information about COMMGR. ISPSoft needs to be connected to a PLC by means of COMMGR.**

1.3 Description of ISPSoft-Programming Tool for PLCs

ISPSoft is a programming tool that realizes high-level to IEC 61131-3 standard programming concept for PLCs, and enables genuine structured design.



The interface of ISPSoft is described below.

❶ **Function area:** The main functions of ISPSoft are included. The functions which are used more frequently are on the toolbars, and the functions which are used less frequently are on the menu bar.

❷ **Project management area:** The framework of a project is displayed in this area. Users can understand the relation among the objects in the project by means of the tree structure. The efficiency in managing the project is also increased.

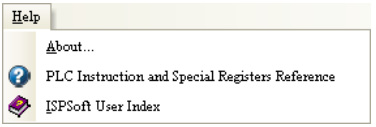
❸ **Working area:** Users can edit a project in this area.

❹ **Output area:** The execution of some functions generates information. The information is displayed in this area.

❺ **Status area:** The information about a project and communication is displayed in this area.

❻ **Delta Library**: The contents of Delta library and user-defined library are displayed in this area.

When using ISPSoft, the users can click an item on the **Help** menu to get help.



Item	Description
About…	Users can get the information about the version of the software, and the date when the software is released.
ISPSoft User Index	Users can get the usage of the software. (Alternatively, the users can click on the file toolbar to get the usage of the software.)
PLC Instruction and Special Registers Reference	Users can get the information about instructions and registers. If the users click an instruction in the program editing area and press F1 on the keyboard, they can get the information about the instruction.

The features of ISPSoft are listed below.

1. Enhancement of structured development

   Based on the IEC 61131-3 standard, basic program units are called “program organization units” (POUs). The management of a group of POUs by means of a tree structure is added. This function can provide hierarchical management.

2. Supporting Large-scale project development

   With the trend that the size of application software increases, it is getting common for several developers to work together on a program. ISPSoft manages projects by means of integrating tasks. The efficient and convenient development environment that ISPSoft provides enables users to apply PLCs to more complex control systems as well as to small control systems.

3. Enhanced variable management

   Variable programming that does not depend on PLC memory addresses is a

fundamental concept of the ISPSoft to improve program modularization and re-usability. ISPSoft supports the function of importing and exporting data from and to Microsoft Excel. With above functions, the tasks of defining and managing variables can be implemented with greater efficiency.

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Chapter 2 Installation of UT Series Starter Kits

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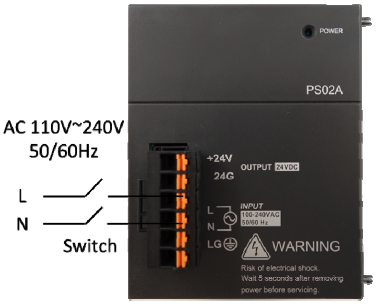
2.1 Installing Hardware

2.1.1 Connecting a PLC to an I/O Board and a Power Supply Module

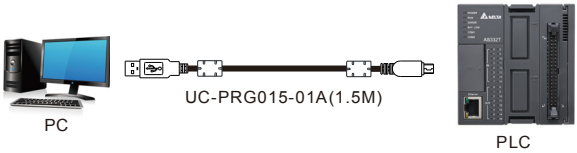
- Assembling the UT-AS332-C starter kit:

	1. Install the digital I/O board. Please refer to section 4.4.1 for more information about the arrangement of input/output terminals.
	2. AS-PS02A : Connect a single-phase 110/220 V cable to the L and N terminals. Note: To prevent staff from being hurt, the external AC power which is used should be switched off before hardware is wired.

	3. Connecting AS-PS02A to AS332T-A.
	4. Input wiring: sinking, connect the +24V power input to the pin 37 or 38 of the I/O board (S/S). 5. Output wiring: sinking, connect the pin 17 or 18 of the I/O board to the 24G.

2.1.2 Connecting a Personal Computer to AS332T-A

Users have to connect a personal computer to AS332T-A by means of UC-RRG015-01A.



2.2 Installing ISPSoft

If an older version of ISPSoft has been installed on a computer, users have to uninstall it before installing ISPSoft.

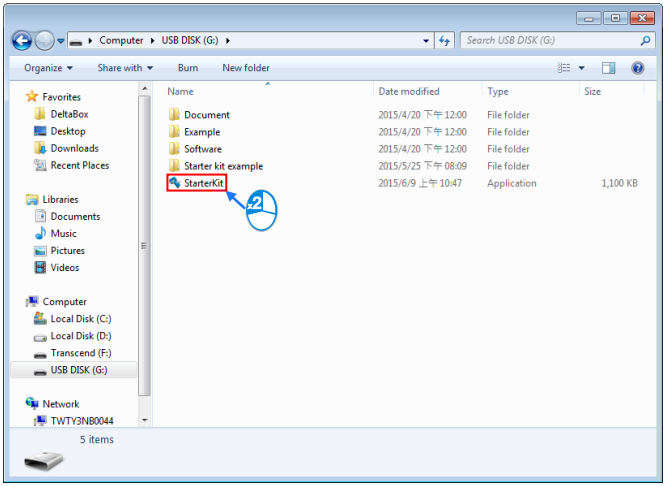
Graphic representations

Graphic representation	Description
	Clicking the left mouse button
	Clicking the right mouse button
	Clicking the left mouse button two times in quick succession
	Pressing and holding the left mouse button, and then moving the mouse without releasing the button
	Typing with a keyboard
①	Operating sequence (The graphic representation is used when an operating sequence is mentioned, e.g. ① and ②.)
❶	Number used to describe a figure

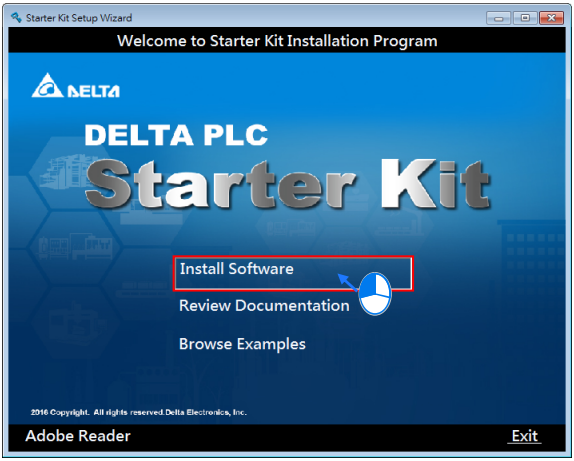
Installing ISPSoft:

(1) Start the operating system installed on a computer. Users have to log on to the system as a system administrator before they install ISPSoft.

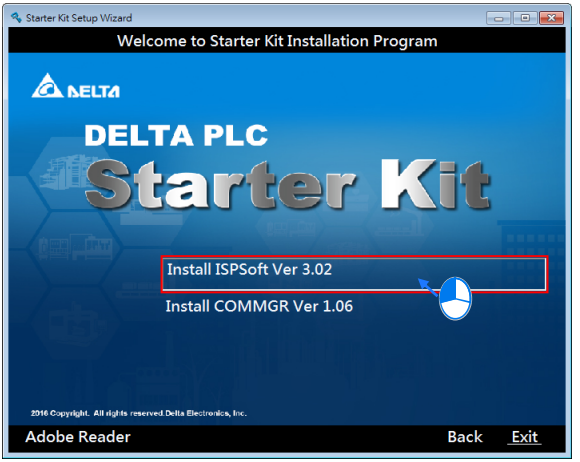
(2) Insert the USB flash drive which is an attachment to a UT series starter kit into the computer, and then double-click StarterKit.exe in the USB flash drive.



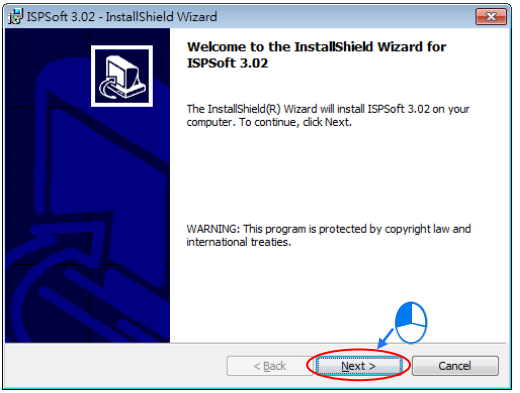
(3) Click **Install Software**.



(4) Click **Install ISPSoft Ver x.xx**. (Alternatively, the users can download the installation program from the official website of Delta http://www.deltaww.com. (Before the installation program downloaded from the website is installed, it needs to be decompressed.))

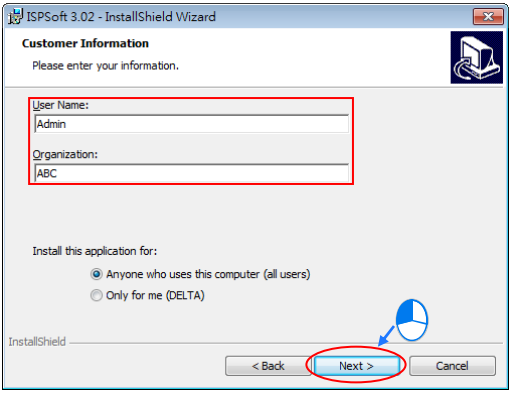


(5) Click **Next** in the **ISPSoft x.xx - InstallShield Wizard** window.

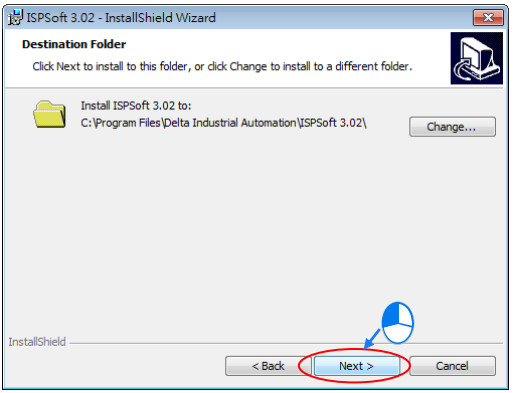


(6) Select the **I accept the terms in the license agreement** option button, and then click **Next**.

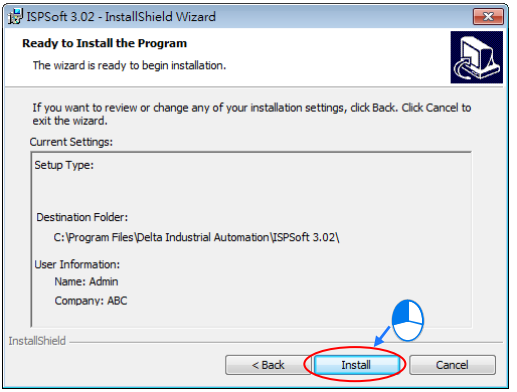
(7) Type related information in the **User Name** box and the **Organization** box, and then click **Next**.



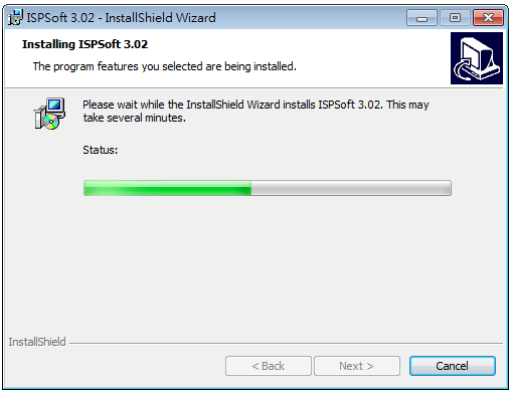
(8) Leave the default path unchanged, or click **Change…** to change the path. Click **Next** to proceed to the next step.

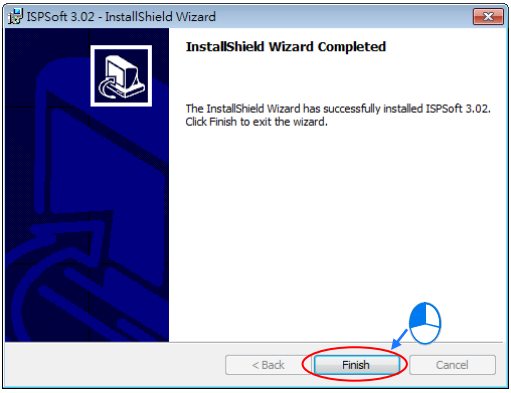


(9) Check installation settings, and then click **Install**.



(10) After ISPSoft is installed, shortcuts to the program will be created on the desktop and the **Start** menu. Click **Finish** to complete the installation.





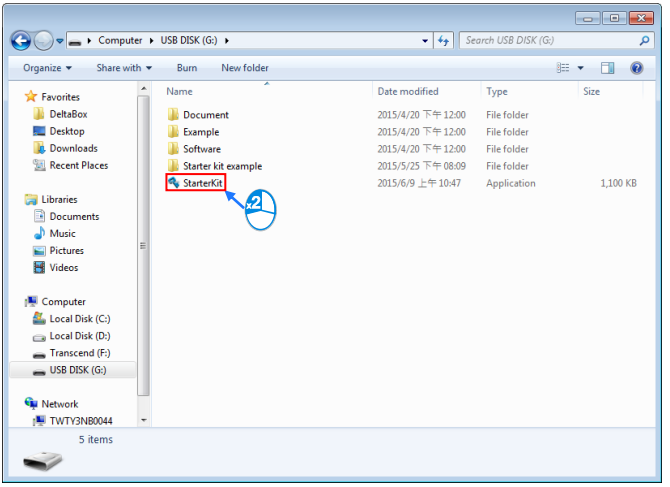
(11) Start ISPSoft. (Click the **Start** button → **All Programs** → **Delta Industrial Automation** → **PLC** → **ISPSoft x.xx** → **ISPSoft x.xx**, or click on the desktop.)

2.3 Installing COMMGR

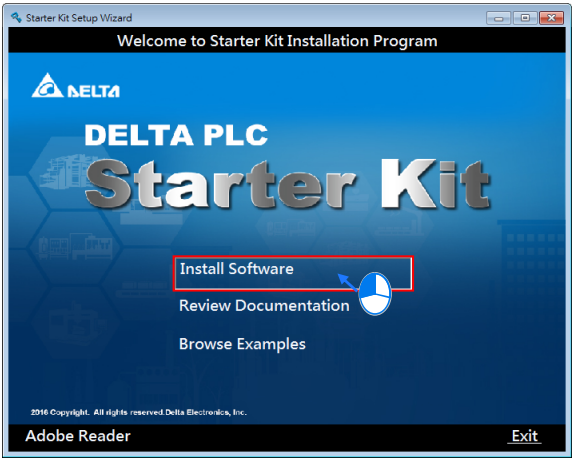
COMMGR is software independent of ISPSoft. It must be installed and uninstalled separately. If an older version of COMMGR has been installed on a computer, users have to uninstall it before installing COMMGR.

(1) Start the operating system installed on a computer. Users have to log on to the system as a system administrator before they install ISPSoft.

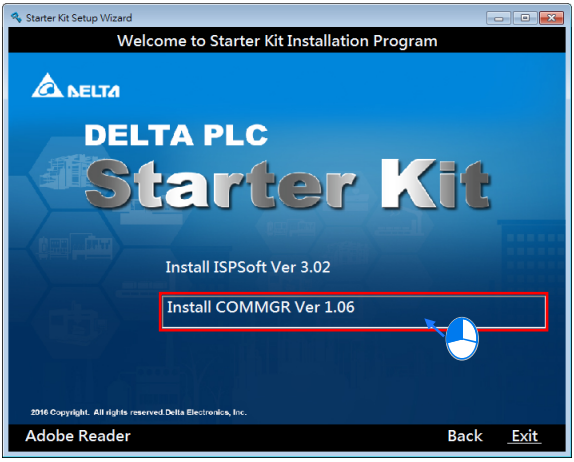
(2) Insert the USB flash drive which is an attachment to a UT series starter kit into the computer, and then double-click StarterKit.exe in the USB flash drive.



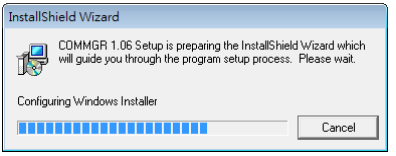
(3) Click **Install Software**.

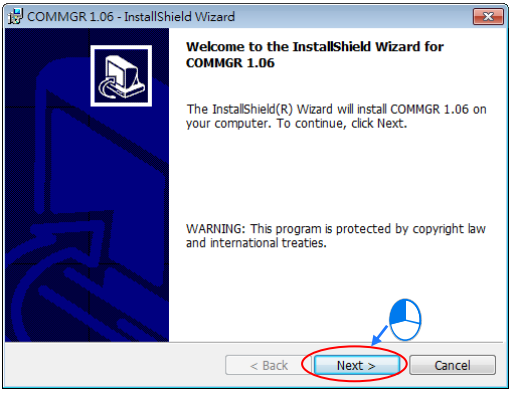


(4) Click **Install COMMGR Ver x.xx**. (Alternatively, the users can download the installation program from the official website of Delta http://www.deltaww.com. (Before the installation program downloaded from the website is installed, it needs to be decompressed.))

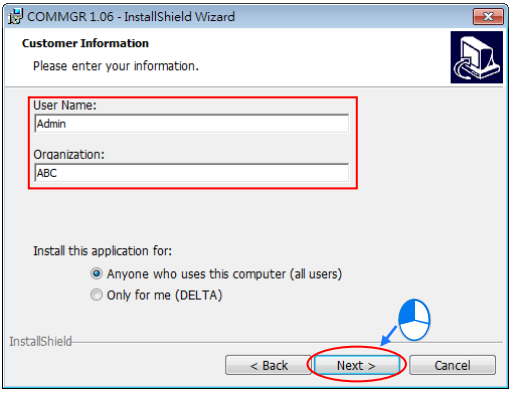


(5) Click **Next** in the **COMMGR x.xx - InstallShield Wizard** window.

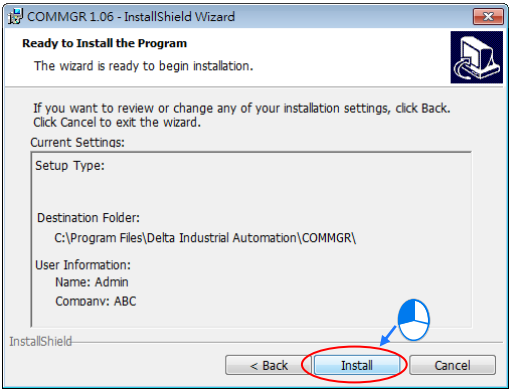




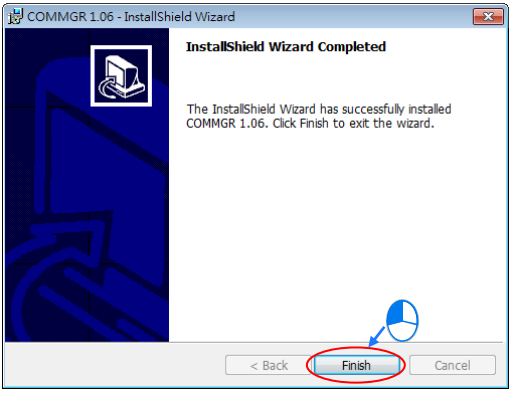
(6) Type information in the **User Name** box and the **Organization** box, and then click **Next**.



(7) Check installation settings, and then click **Install**.



(8) After COMMGR is installed, a shortcut to the program will be created on the **Start** menu. Click **Finish** to complete the installation.



(9) Start COMMGR. (Click the **Start** button → **All Programs** → **Delta Industrial Automation** → **Communication** → **COMMGR** → **COMMGR**.)

MEMO

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Chapter 3 Example Programs

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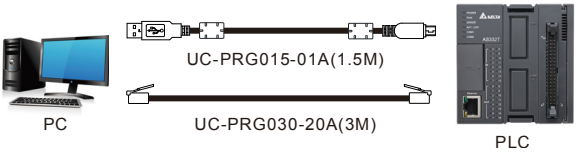
3.1 Example

The steps of writing programs in ISPSoft are described below. After users follow the steps introduced below, they will know how to write programs for a PLC. The example below is applicable to UT series starter kits. The starter kit used in the example is UT-AS332-C.



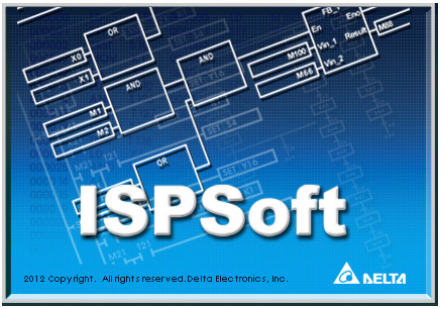
3.1.1 Creating a Project for a PLC

After the users install hardware and understand the control logic in the example, they can prepare to write a program.

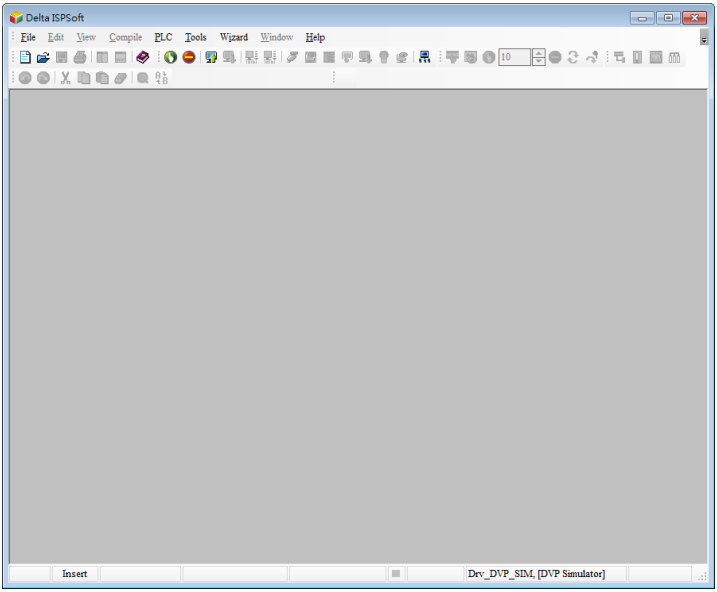
Please complete the step in section 2.1.2 before writing the example program shown below.

Step 1: Start ISPSoft. (Click the **Start** button → **All Programs** → **Delta Industrial Automation** → **PLC** → **ISPSoft x.xx** → **ISPSoft x.xx**, or click on the desktop.)

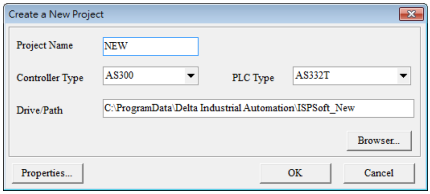
Welcome screen



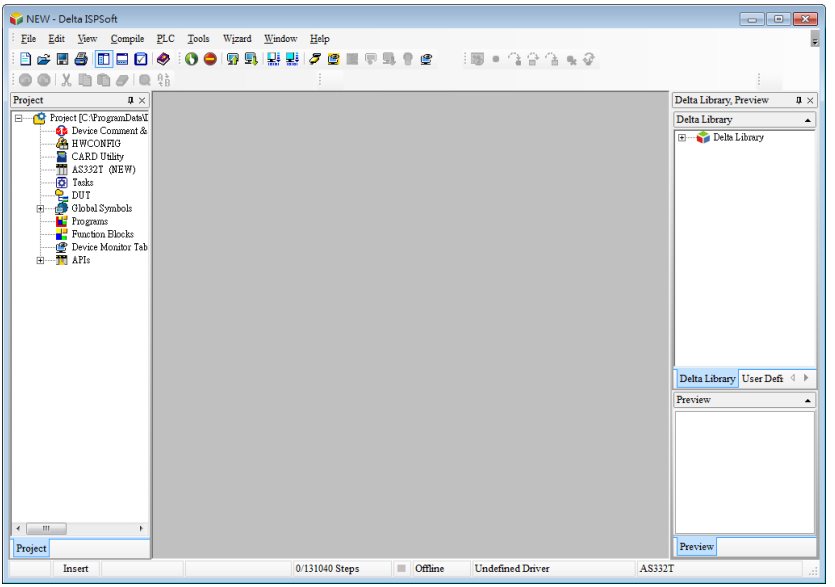
Main screen



Step 2: After is clicked, a new project will be added. The project name typed in the **Project Name** box is "NEW". Select **AS300** in the **Controller Type** drop-down list box, select **AS322T** in the **PLC Type** drop-down list box, leave the default path in the **Drive/Path** box unchanged, and click **OK**.



After **OK** in the **Create a New Project** window is clicked, a project environment will be displayed (the project name “NEW” will appear in the upper left corner of the project environment).

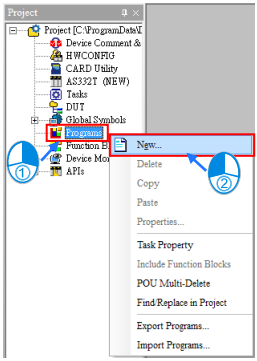


3.1.2 Creating a Main Program

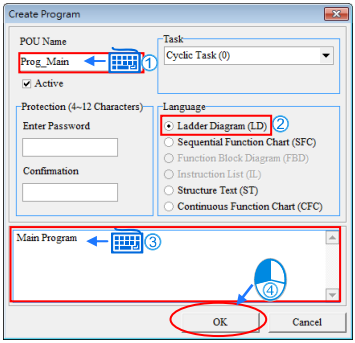
Step 1: Creating a POU

Creating a main program. Right-click Programs in the project management area in ISPSoft to add a new POU.

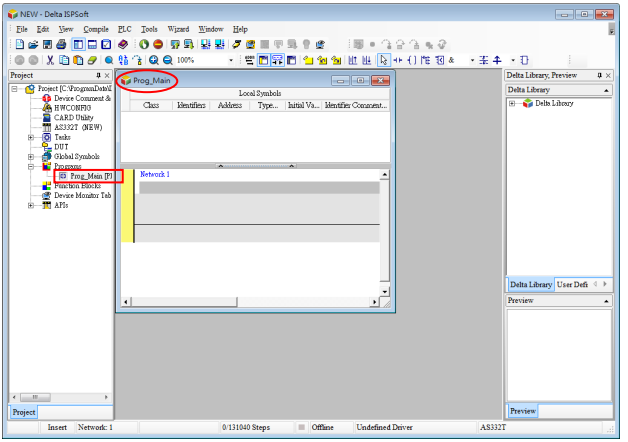
Note: Please refer to Chapter 5 in ISPSoft User Manual for more information about creating a POU.



Type “Prog_Main” in the **POU Name** box, select **Ladder Diagram (LD)** in the **Language** section, type “Main Program” in the **POU Comment** box, ,and click **OK**.

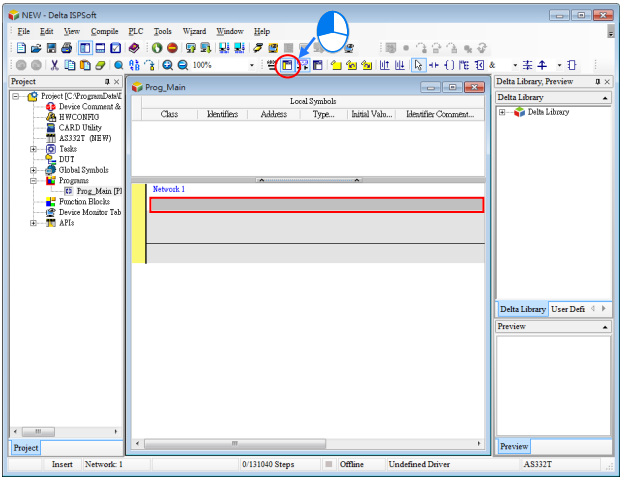


The users can see the **Prog_Main** window on the main screen.

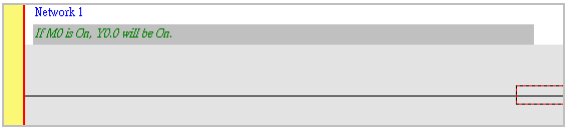


Step 2: Writing a program

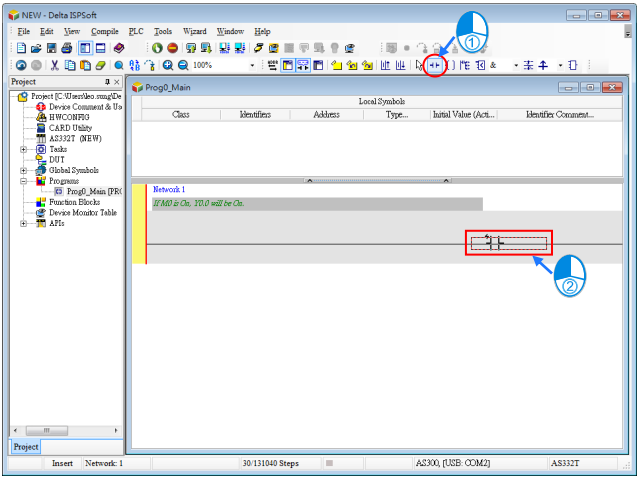
The users can prepare to write a main program. In order to scan a program conveniently, the users can develop the habit of writing comments. If the users want to write network comments, they have to click .



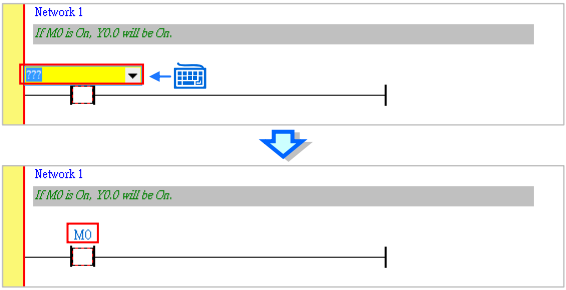
Type a comment in the comment box for network 1. If the users want to start a new line of text at a specific point, they can press Shift+Enter on the keyboard.



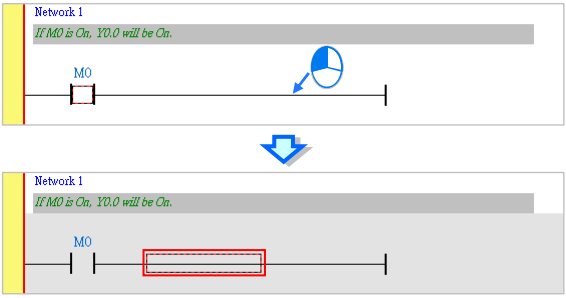
The users can begin to edit program code. The programming language used here is a ladder diagram. Please click ⊣⊢, and then move the mouse cursor to the red frame. If the mouse cursor becomes ⊣⊢, the users can click the left mouse button.



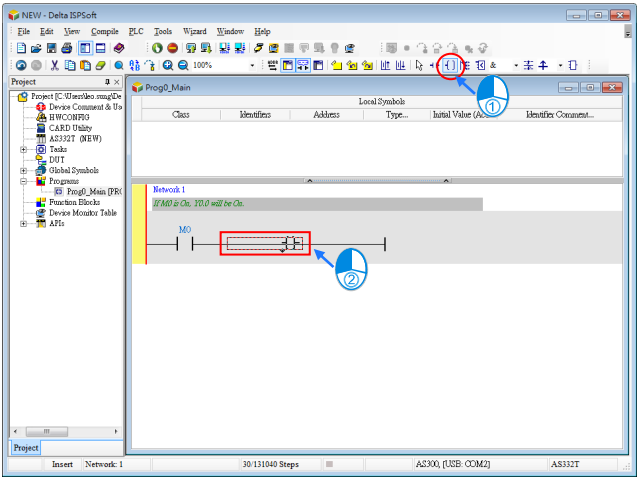
Click ???, and type “M0”.



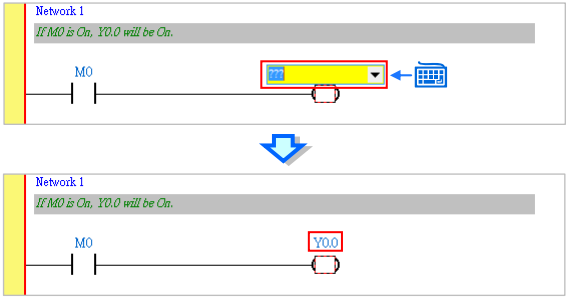
After the users click the line at the right side of the M0 contact, the red frame on the M0 contact will move to the line.



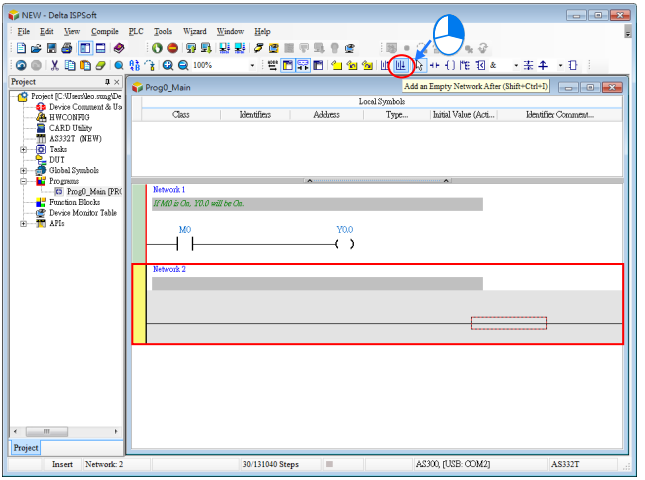
Click , move the mouse cursor to the red frame, and click the left button on mouse.



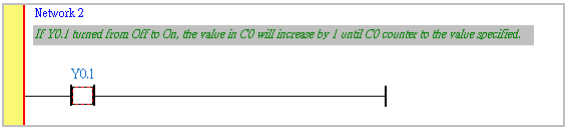
Click ???, and type “Y0.0”.



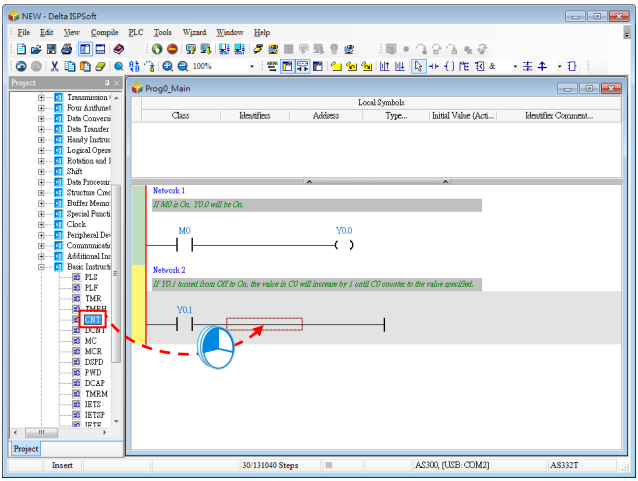
Click to add a new network.

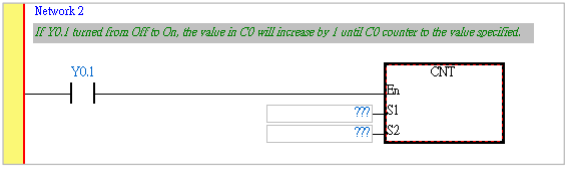


Create the following program in the same way.

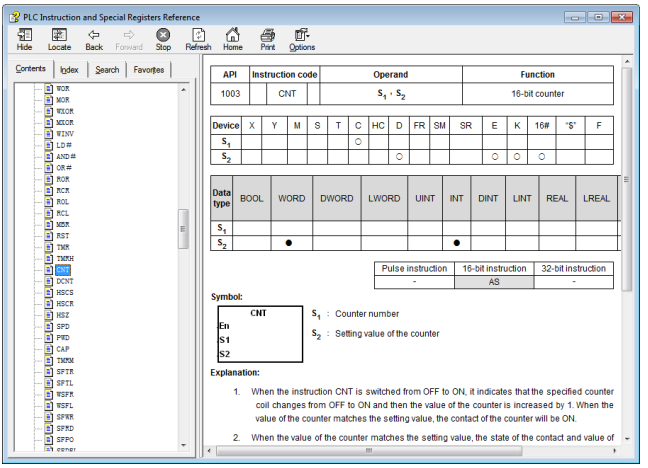


Click APIs in the project management area in ISPSoft, click **Basic Instructions**, and drag **CNT** to the red frame.

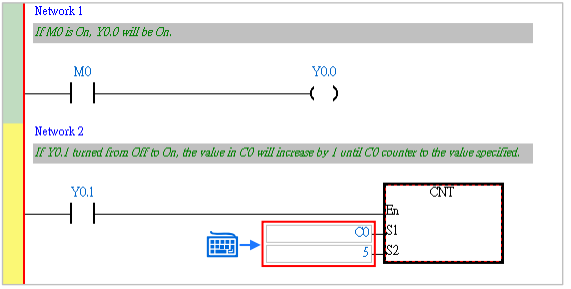




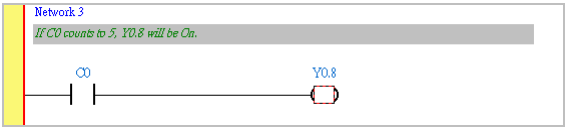
If the users do not know the usage of CNT, they can click the CNT instruction block, press F1 on the keyboard, and refer to the information in the **PLC Instructions and Special Registers Reference** window.



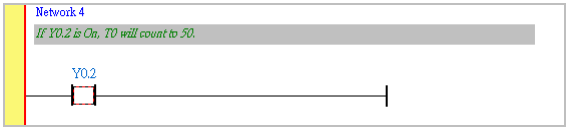
Click ??? in the box at the left side of S1, and type “C0”. Click ??? in the box at the left side of S2, and type “5”.



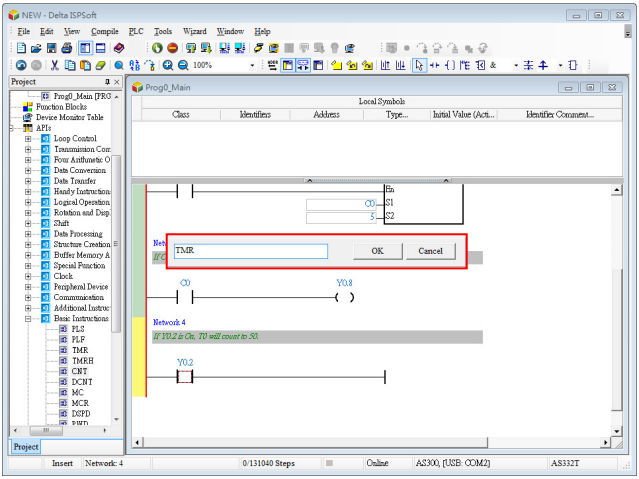
Click to add a new network, the input contact C0, and the output coil Y0.8.



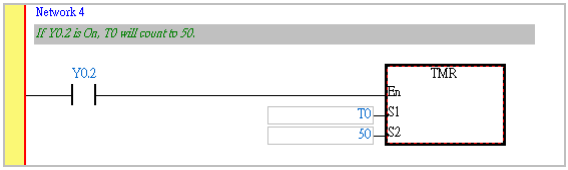
Click to add a new network, and the input contact Y0.2.



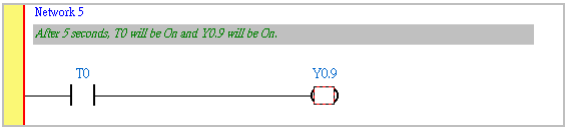
Type “TMR” directly.



Click ??? in the box at the left side of S1, and type “T0”. Click ??? in the box at the left side of S2, and type “50”.



Create the program below.

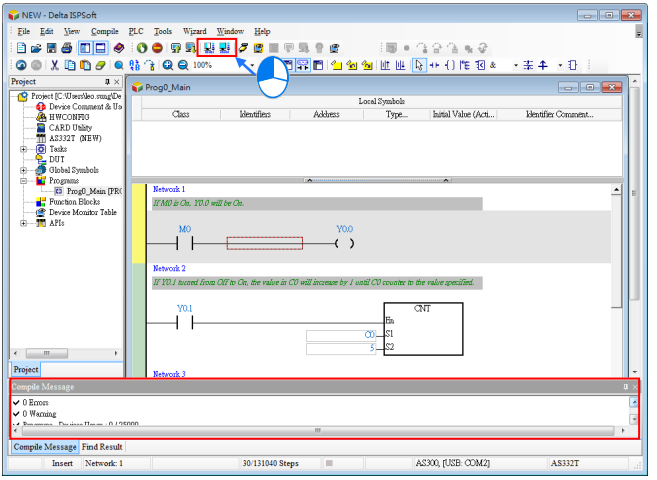


Step 3: Compiling the program created

The writing of the program will be complete after the users save the file.

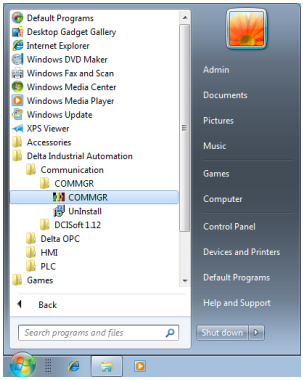
3

The users can click to check the syntax of the program, and click to compile the project. The compiling of a project is different from the checking of the syntax of a program in that it is composed of the checking of syntax, and the compiling of all programs and function blocks.

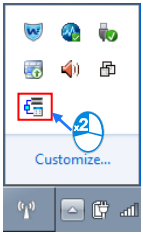


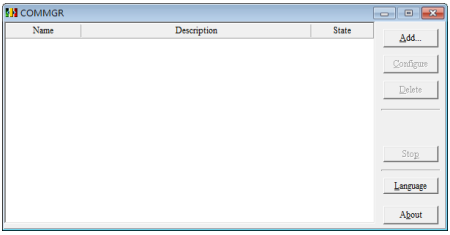
3.1.3 Setting COMMGR for UT-AS332-C

Step 1: Start COMMGR. (Click the **Start** button → **All Programs** → **Delta Industrial Automation** → **Communication** → **COMMGR** → **COMMGR**.)

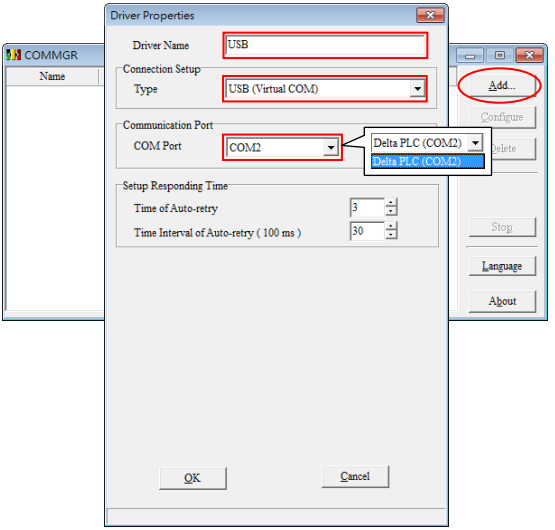


Step 2: After COMMGR is started, the icon representing COMMGR will appear in the notification area. Double-click the icon representing COMMGR to open the **COMMGR** window.

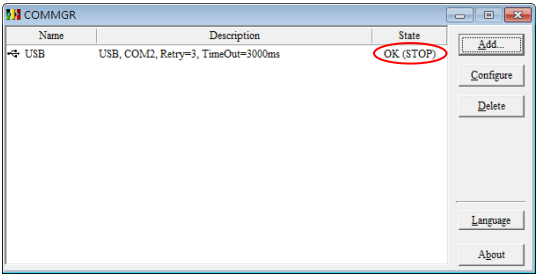




Step 3: After the **COMMGR** window is opened, users can begin to set a driver. A USB cable is used to connect the computer and AS332T-A here, and therefore a USB driver needs to be created. First, click **Add**. Then, create a USB driver in the way shown below.



Step 4: After a USB driver is created, it will appear in the **COMMGR** window. If the computer is normally connected to AS332T-A, **OK** will appear in the **Status** column.

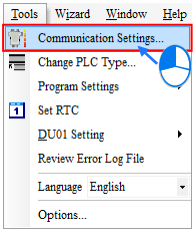


If the users click or in the **COMMGR** window, the **COMMGR** window will disappear from the desktop, and will be visible only as an icon in the notification area.

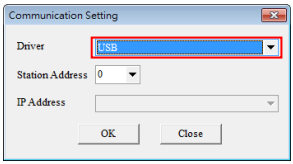
3.1.4 Downloading a PLC Project

- **Setting communication**

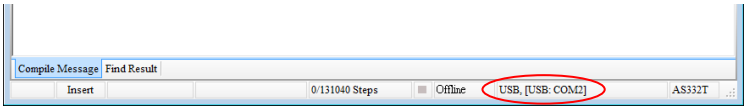
After the setting of COMMGR is complete, users can set communication in ISPSoft. First, click **Communication Settings…** on the **Tools** menu to open the **Communication Setting** window.



In the **Communication Setting** window, select **USB** in the **Driver** drop-down list box, and click **OK**.

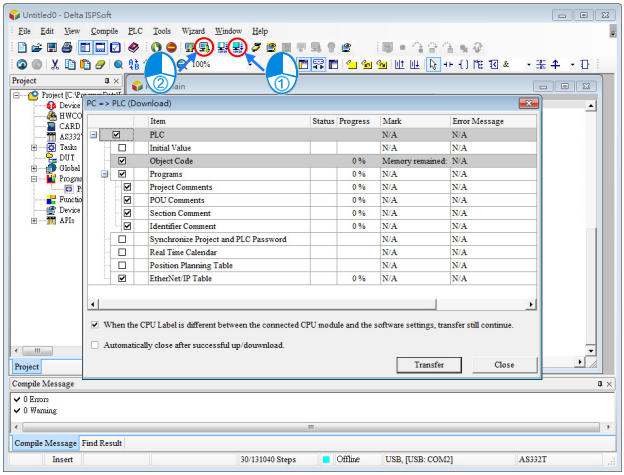


The users can see the information about the driver which is connected on the lower right corner of the status bar.

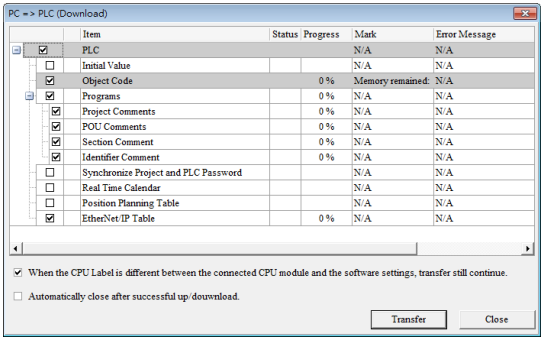


- **Downloading a PLC program**

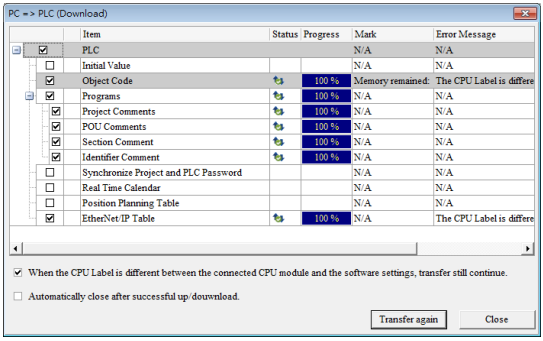
After users write a PLC program, they can prepare to download the program. The program created here has been compiled. If the program is modified, the users can click to check the program. After the compiling of the program is successful, the users can click to download the program.



There are several transfer options in the **Transfer Setup** window. The object code is the necessary condition for the operation of the CPU module, and therefore the **Object Code** checkbox is selected. In order to maintain the program, the **Program** checkbox and the **Comments** checkbox are selected in this example. The current project will be backed up in the CPU module, and the program will not be lost. Besides, if users want to modify the program on the spot, and forget to bring the original program, they can upload the original program from the CPU module to the computer to modify the program.

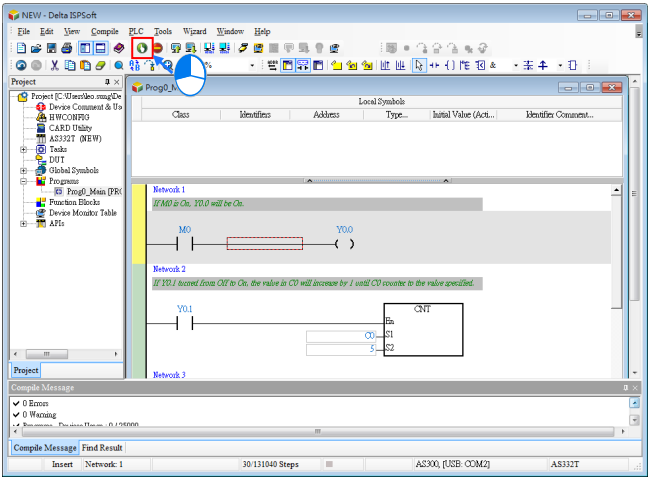


After the users click **Transfer**, the downloading of the program will be complete.



Finally, check the I/O LED indicator on the module and the status of the equipment. After users make sure that the whole system can be tested, they have to switch the CPU module on so that the CPU module starts to run.

After the program is downloaded, the users can click if they want to run the PLC.



Alternatively, the users can move the RUN/STOP switch on the PLC to the RUN position.

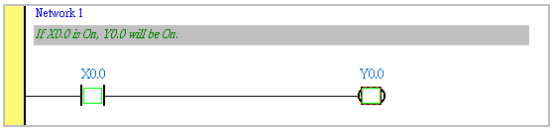
3.1.5 Monitoring a Program

When a program is executed, users can monitor the program to understand the current logical control state of the system, or modify the values in some devices to test the system. The monitoring of a program is described below.

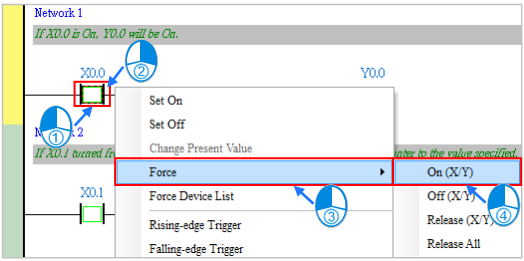
- **Monitoring a program**

  Open the **Prog_Main** window, and click .

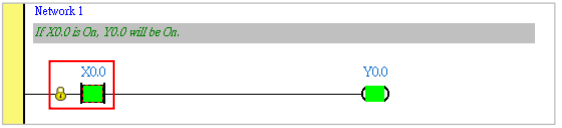
After users click , the program will be monitored. The program is composed of a logic program, and the information about devices. (The states of Boolean devices are indicated by green backgrounds (On) or white backgrounds (Off), and the information about other devices is indicated by values or text.)



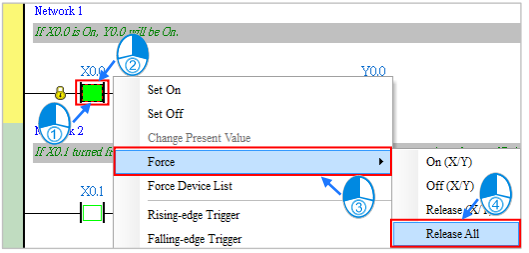
If a device corresponds to an actual I/O device, **Set On** and **Set Off** cannot be used to change the state of the device because the state of the actual I/O device immediately overwrites the value which is set, and **Force On** and **Force Off** can be used instead. X0.0 is forced to be On here.



The state of X0.0 is changed, and a lock symbol indicating that the device is forced to be On appears.



After the system is tested, the users have to cancel the forced state of the device so that the PLC can return to normal.

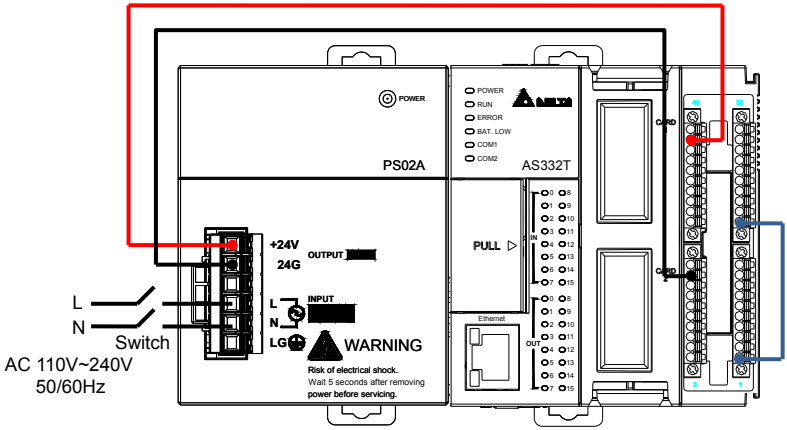


3.1.6 Using a PLC with an I/O Board

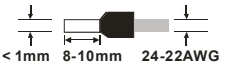
- **I/O Board Pin Definition**

AS332T	I/O Board configuration			AS332T
-	40		39	-
S/S	38		37	S/S
X0.15	36		35	X0.14
X0.13	34		33	X0.12
X0.11	32		31	X0.10
X0.9	30		29	X0.8
X0.7	28		27	X0.6
X0.5	26		25	X0.4
X0.3	24		23	X0.2
X0.1	22		21	X0.0
-	20		19	-
C0	18		17	C0
Y0.15	16		15	Y0.14
Y0.13	14		13	Y0.12
Y0.11	12		11	Y0.10
Y0.9	10		9	Y0.8
Y0.7	8		7	Y0.6
Y0.5	6		5	Y0.4
Y0.3	4		3	Y0.2
Y0.1	2		1	Y0.0

- **Wiring**



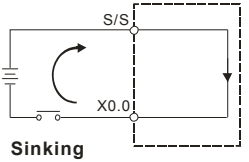
1. Please use single-core or multi-core cables. The diameters of the cables used should be within the range between 24 AWG and 22 AWG (1 mm). The specifications for the terminals and the wiring are shown in the figure. The temperature of the copper conductor should be 60/75°C.



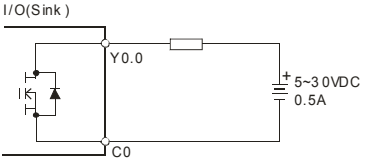
2. Supply power (110~240VAC 50/60Hz) to AS-PS02A.

3. Connect the I/O board to the PLC.

4. Input wiring: sinking, connect the +24V power input to the pin 37 or 38 of the I/O board (S/S).

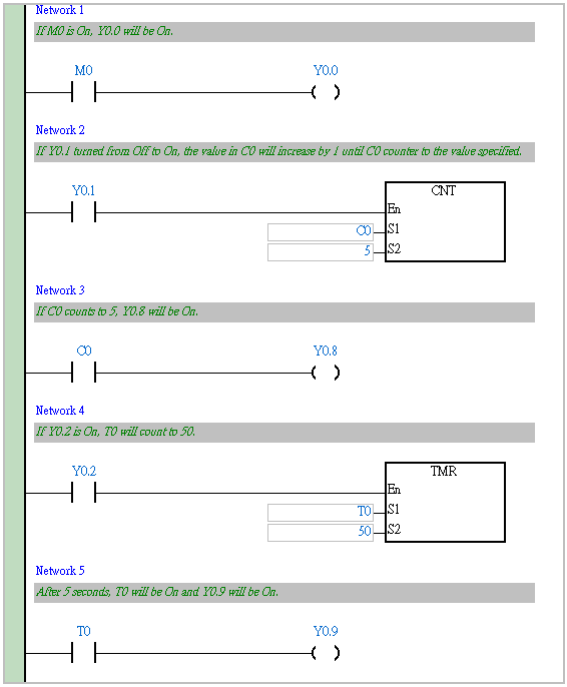


5. Output wiring: sinking, connect the pin 17 or o8 of the I/O board to the 24G.



6. Connect the pin 1 (Y0.0) of the I/O board to the pin 21 (X0.0).

- **Complete program example**



1. If M0 is turned from Off to On, Y0.0 will be On, and X0.0 will be turned On.
2. If M0 is turned from On to Off, Y0.0 will be Off, and X0.0 will be turned Off.
3. If Y0.1 is turned from Off to On five times, C0 will be turned from Off to On, Y0.8 will be turned from Off to On.
4. If Y0.2 is turned from Off to On, T0 will begin to measure time. After the time that T0 measures reaches 5 seconds, T0 will be turned from Off to On, Y0.9 will be turned from Off to On.
5. If Y0.2 is turned from On to Off, T0 will be Off, Y0.9 will be Off.

MEMO

4

Chapter 4 Appendix

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4.2.2 AS332T-A 4-3

4.3 Connecting Communication Cables 4-5

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4.1 Introduction of Hardware

4.1.1 AS-PS02A

Input: 100~240 VAC, 50/60 Hz
Output: 24VDC/1.5A, 36W (for PLC internal use)
Output: 24VDC/0.5A, 12W (for external use)

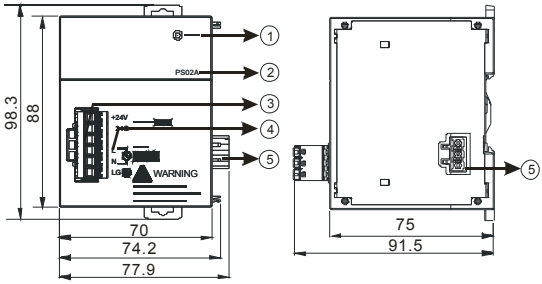
4.1.2 AS332T-A

CPU module, NPN output, 1x Ethernet port, 2x RS-485 ports, 1x USB port, 1x Micro SD interface, 2x function cards (optional), supporting 32 I/Os (16DI+16DO) and up to 1024 I/Os, the program capacity:128K steps

4.2 Profiles and Dimensions

4.2.1 AS-PS02A

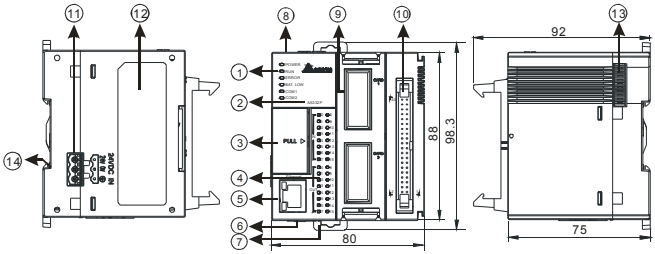
- Profile



1. Power indicator (Green)	2. Model name
3. Wiring terminal	4. Terminal layout
5. Power output (Connected to AS CPU)	

4.2.2 AS332T-A

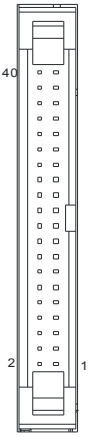
- Profile



1. Status indicator	2. Model name
3. RUN/STOP switch, USB communication port, SD card slot, VR0/VR1	4. I/O indicator
5. Ethernet communication port	6. COM1/COM2 port
7. DIN rail clip	8. Battery holder (battery NOT included)

9. Extension card slot	10. MIL connector
11. DC power input	12. Label
13. Extension module communication port	14. Grounding shrapnel

➢ I/O configuration

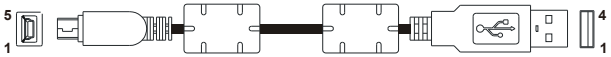
			AS332T	
40		39	-	-
38		37	S/S	S/S
36		35	X0.15	X0.14
34		33	X0.13	X0.12
32		31	X0.11	X0.10
30		29	X0.9	X0.8
28		27	X0.7	X0.6
26		25	X0.5	X0.4
24		23	X0.3	X0.2
22		21	X0.1	X0.0
20		19	-	-
18		17	C0	C0
16		15	Y0.15	Y0.14
14		13	Y0.13	Y0.12
12		11	Y0.11	Y0.10
10		9	Y0.9	Y0.8
8		7	Y0.7	Y0.6
6		5	Y0.5	Y0.4
4		3	Y0.3	Y0.2
2		1	Y0.1	Y0.0

4.3 Connecting Communication Cables

4.3.1 Introduction of Communication Cables

- UC-PRG015-01A (1.5 m)

Mini USB ↔ USB A Type

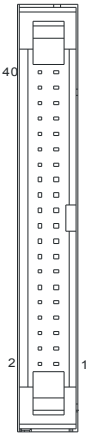


Mini USB ⟷ **USB A Type**

+5V(RED): 1	⟷	1: +5V(RED)
D-(WHITE): 2	⟷	2: D-(WHITE)
D+(GREEN): 3	⟷	3: D+(GREEN)
GND(BLACK): 5	⟷	4: GND(BLACK)

4.4 I/O Board

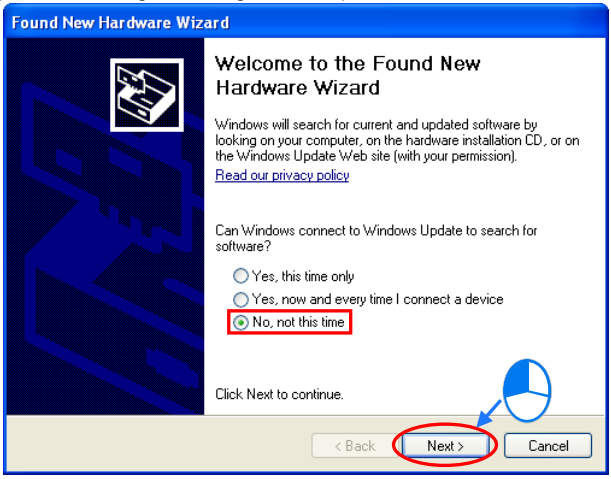
4.4.1 Arrangement of Input/Output Terminals

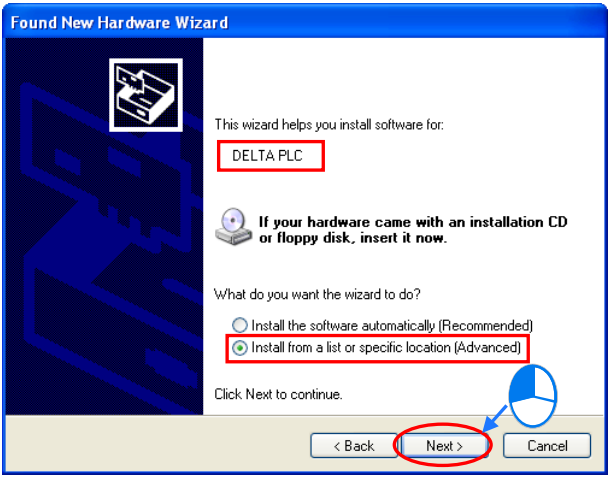
I/O Board	I/O configuration			AS332T	
	40		39	-	-
	38		37	S/S	S/S
	36		35	X0.15	X0.14
	34		33	X0.13	X0.12
	32		31	X0.11	X0.10
	30		29	X0.9	X0.8
	28		27	X0.7	X0.6
	26		25	X0.5	X0.4
	24		23	X0.3	X0.2
	22		21	X0.1	X0.0
	20		19	-	-
	18		17	C0	C0
	16		15	Y0.15	Y0.14
	14		13	Y0.13	Y0.12
	12		11	Y0.11	Y0.10
	10		9	Y0.9	Y0.8
	8		7	Y0.7	Y0.6
	6		5	Y0.5	Y0.4
	4		3	Y0.3	Y0.2
	2		1	Y0.1	Y0.0

4.5 Installing the AS300 Driver

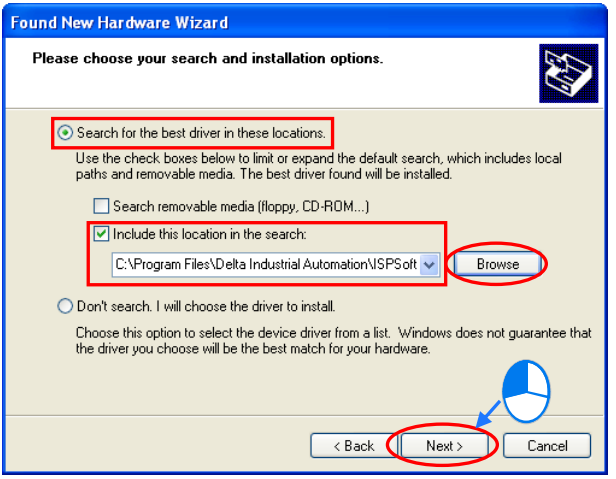
If the computer is not connected to the USB port on the CPU module, please connect the CPU module to the computer with an USB cable. The following window will appear.

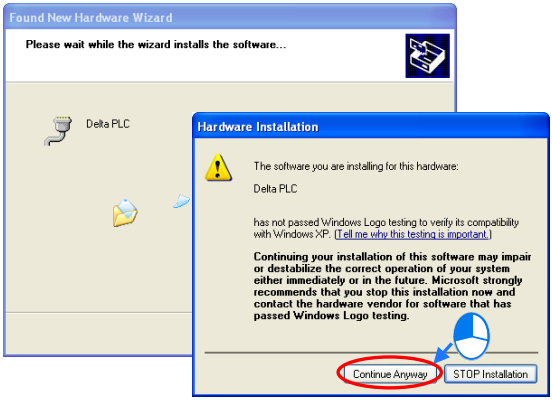
Please complete the setting according to the steps below.

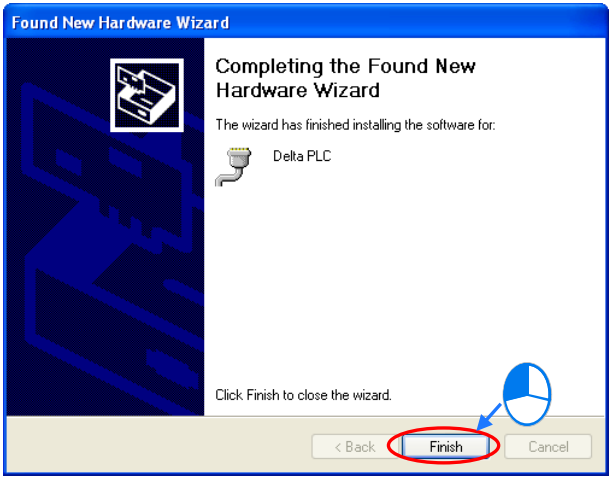




The path C:\Program Files\Delta Industrial Automation\ISPSoftx.xx\drivers\Delta_PLC_USB_Driver shown in the picture below is the folder where the software is installed. If the path is modified, please select the folder where the software will be installed.

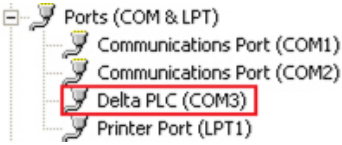






After the software is installed, users can see the USB driver in the Device Manager window.

(The COM number of the USB may vary from computer to computer.)



MEMO

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