TouchPAD

TPD/VPD Series HMI Device

User Manual Version 1.0.12

ICP DAS Co., Ltd.

Support

ICP DAS takes your problem as ours.

If you have any problem, please feel free to contact us.
You can count on us for quick response.

Email: service@icpdas.com

Tel: 886-3-5973336

Also, the FTP site of ICP DAS has contents about TouchPAD which you may be interested in. We believe that those contents may be helpful to your work.

FTP: ftp://ftp.icpdas.com/pub/cd/touchpad/

Preface

Thank you for buying TPD/VPD Series HMI Devices, TouchPADs, which are made by ICP DAS Co., Ltd. We suggest you read through this user manual before you set up these devices and develop their programs.

Purpose

- This manual shows how to use TouchPADs and develop programs.
- This manual mainly contains the following parts:
    - Introduction: basic understandings of TouchPADs.
    - Hardware: specifications, dimensions, and installations.
    - Software: mainly how to build a project and HMIWorks introductions.

Personnel

This manual is fit for following personnel:

- End Users
- Engineers
- Technicians

Table of Contents

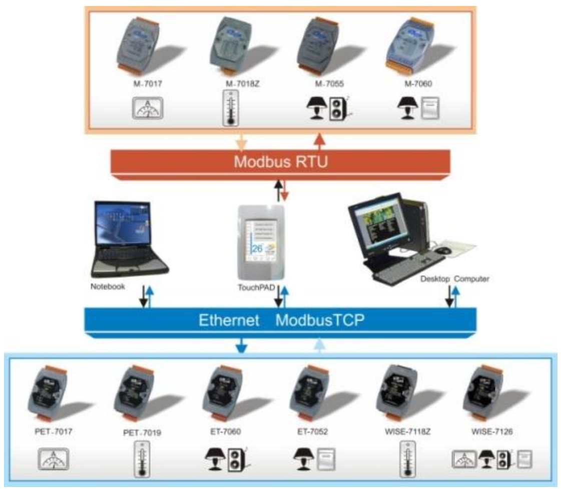
1. Introduction

Our solution for HMI (Human Machine Interface) is composed of GUI (Graphical User Interface) based touch screens and an integrated software development package. ICP DAS hears the voices of our customers and is dedicated to providing a series of solutions particularly for intelligent building, equipment monitoring, factory automation and automatic controls. Its development software, HMIWorks, provides plenty of widgets and a variety of templates. Combined with the high resolution color touch screen of the TouchPAD series, a GUI can be realized with your own unique fashion and style. Development is no longer difficult and project accomplishment is within reach.

ICP DAS provides two types of touch HMI devices, the TPD series and the VPD series. The TPD series is designed for home/building automation applications and the VPD series is designed for factory/machine automation applications. Both have many common features, such as a high-resolution touch screen, RTC, and a variety of communication interfaces, including RS-232/RS-485, Ethernet, USB. However, each still has its own specific features for its respective target applications. For the TPD series, you can use an external wall box to help you smoothly blend the TPD series device into your decoration. For the VPD series, the rubber keypad, IP-65 waterproof front panel and DIN-Rail/panel mounting are designed for harsh environment, and are especially suitable for factories.

1.1. Advanced Features

- Excellent C/P ratio (cost/performance)
- Workable under tough environments, operating temperature: -20℃~70℃
- High Color resolution touch screen
- PoE, Power over Ethernet (TPD-283)
- RS-485 network (TPD-280/TPD-280U/TPD-430/VPD-130)



- WYSIWYG (What You See Is What You Get) GUI design
- Complete and powerful development tool, easy integration with touch HMI devices, quick design for a variety of applications
- Supports the popular C programming language
- Ladder logic design

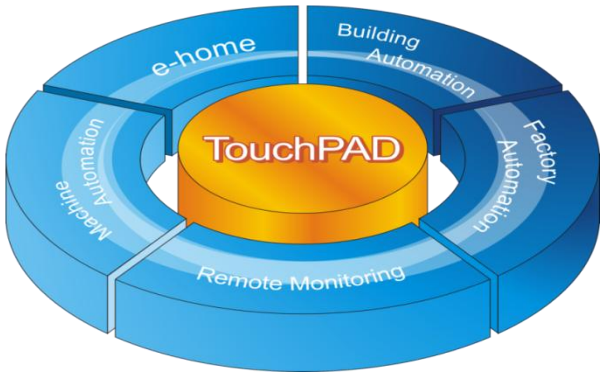
1.2. Applications of TouchPAD

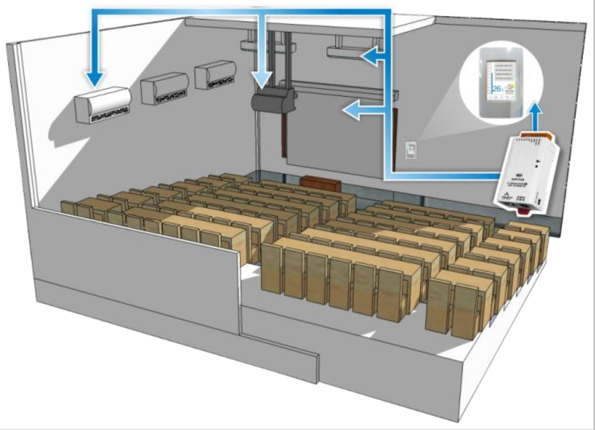
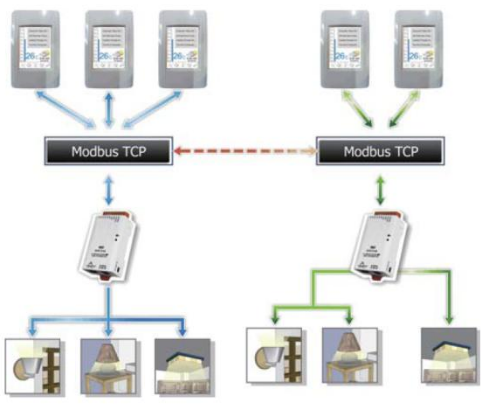
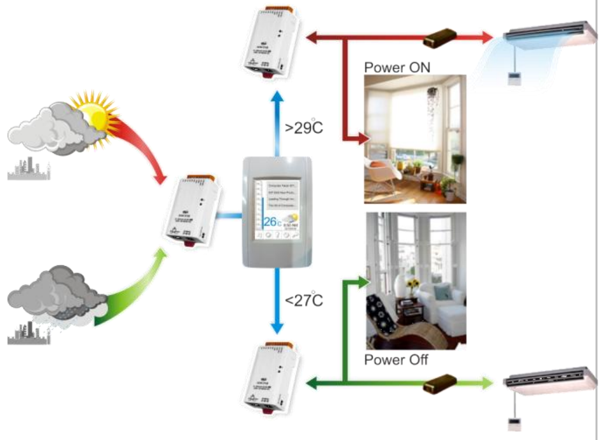
Interactions between human and machine are getting more and more important since automation control has emerged. From systematic surveillance of equipments, status monitoring of house appliances or even measurements of temperature and humidity, HMI devices play an indispensable role in passing information. In the early time, HMI devices consist of lights, meters, 7-segment display. For now, LED and LCD are prevalently used and ICP DAS releases TouchPAD as a state-of-the-art solution.

In addition to GUI and touch LCD, the solution of ICP DAS provides development software package, HMIWorks. HMIWorks satisfies most of the requirements with the WYSIWYG (What You See Is What You Get) design environment. Besides, It has plenty of widgets and varieties of templates, and so it’s easy to present customers with professional interface with modern styles. Moreover, HMIWorks supports C language. It makes easy timing control and logic design and in turns makes TouchPAD more powerful. Through standard communication protocols and SCADA (Supervisory Control and Data Acquisition) software, it is directly inoculated with background software and attains the best effect of completely integration.

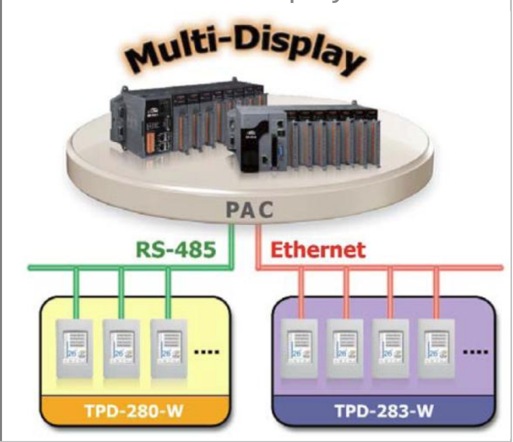
Below are figures of the application fields of TouchPAD, intelligent building and classroom automation. In these examples, TouchPADs are used to control lights, curtains, air conditioners, stereos, projectors, projector screens, and to monitor temperature, humidity, and weather conditions.

Application Fields of TouchPAD

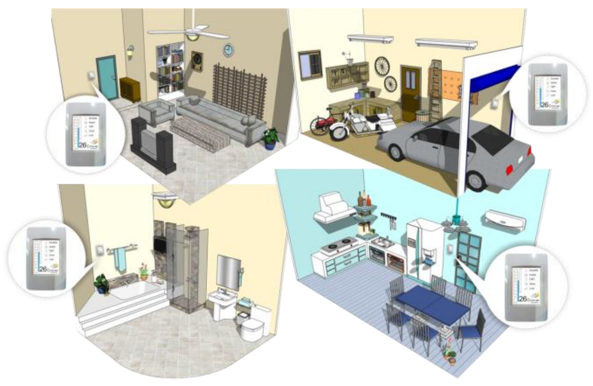


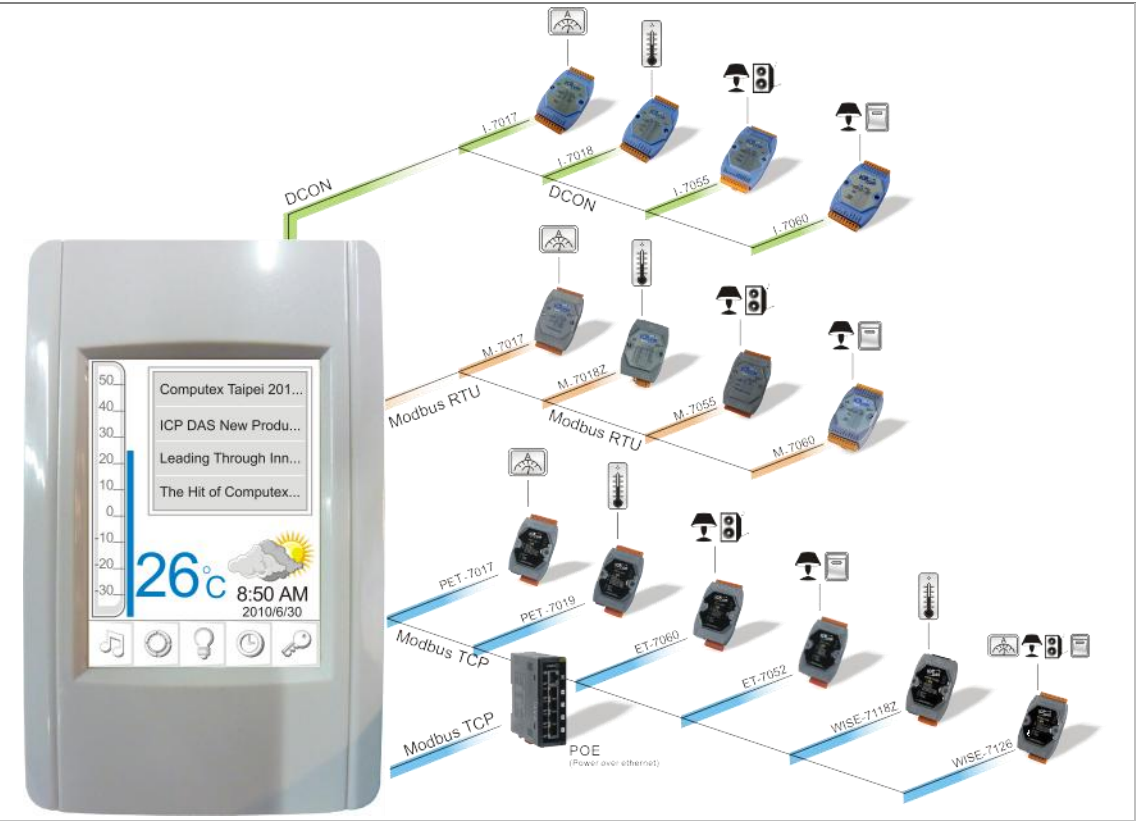
Intelligent Building Example	Classroom Automation Example 
Single-way, Two-way, Multi-way Switches Example 	Temperature Control Example 

Multi-Display



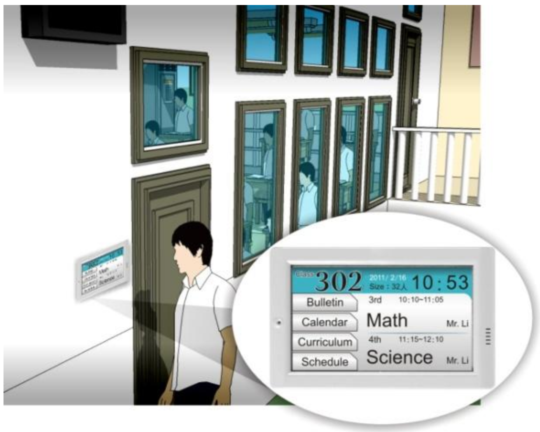
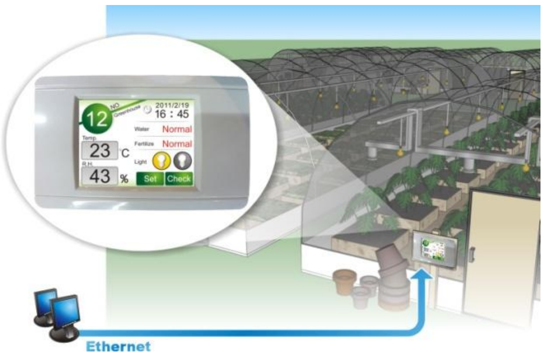
TouchPAD Anywhere

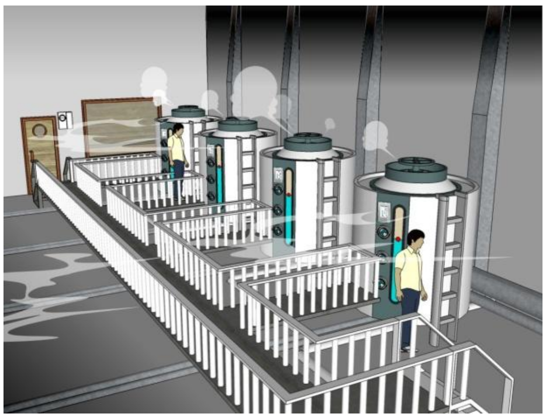




1.3. All Kinds of Situations

TouchPAD can be applied in all kinds of situations you even have imagined. In these situations, TouchPAD is used as a window for signal transmissions and arranges incoming messages.

In the hotel, on the wall X X Business Hotel 1105 2011/2/16 10:53 7 8 9 0 4 5 6 1 2 3 Setting Room Information Room Service	In the apartment building, beside the door
In the exhibition hall, beside the exhibits	In the school, in the classroom  302 2011/2/16 10:53 Bulletin Calendar Curriculum Schedule 3rd 10:10~11:05 Math Mr. Li 4th 11:15~12:10 Science Mr. Li
In the office, outside the meeting room A2 Meeting Room 2011/2/16 Meeting Subject Monthly Jan. Applicant Mr.Chen Appoint Search Meeting Time 11:10~13:10	In the farm, in the front door of the greenhouse  12 2011/2/19 16 : 45 23 °C 43 % Water Normal Fertilize Normal Light Set Check Ethernet

In the hypermarket, on the shelves	In the factory, on the steam chambers
NO : CD1245698120 Item : Cream Cup Cake Price : 79$ Sales Search Welcome, 2F Super 2011/2/16 16 : 45	
In the toilet Meditation Quotes 2011/2/16 11:10 It's wise to appreciate and merciful to give. Do not fatigue driving, proper rest, safety on the road. MTC reminds you.	And more…

2. General Specifications

The format of the model name for the TPD series is as follows:

TPD- XX X(X) - XX

touch screen size
28: 2.8 inch
43: 4.3 inch

communication interface
For 2.8 inch:
0: RS-485
0U: RS-485 + USB
3: Ethernet

For 4.3 inch and above:
0: RS-485 + USB

EU: for European 86 x 86 mm Outlet Box

Model Name	Memory Expansion	Image Storage Capacity	Communication Interface	LCD	RTC	USB 1.1 Client	Outlet Box	Power Input
TPD-280	-	1	RS-485 (including Self-Tuner)	2.8" TFT (Resolution 240 x 320 x 16)	-	-	-	+10 ~ 30 V_{DC}
TPD-280U	16 MB SDRAM/ 8 MB Flash	54			Yes	Yes	-	
TPD-283	-	1	Ethernet (10/100 Mbps)		-	-	-	PoE (IEEE 802.3af, Class 1)
TPD-430	16 MB SDRAM/ 8 MB Flash	32	RS-485 (including Self-Tuner)	4.3" TFT (Resolution 480 x 272 x 16)	Yes	Yes	Suitable for the Outlet Box in United States	+10 ~ 30 V_{DC}
TPD-430-EU		32					Suitable for the European 86 x 86 mm Outlet Box	

* Image Storage Capacity strongly depends on the content and the size of images. The number in the table shows how many images in full screen size can be stored on the device.

The format of the model name for the VPD series is as follows:

VPD- X X X(X)

form factor
1: 103 × 103 mm Panel Mount
2: 182 × 158 mm Panel Mount

display size
2: 2.8 inch Display
3: 3.5 inch Display

Communication interface
0: RS-485 + Rubber Keypad
0N: RS-485

Model Name	Memory Expansion	Image Storage Capacity	Communication Interface	LCD	RTC	USB 1.1 Client	Rubber Keypad	Ingress Protection	Power Input
VPD-130	16 MB SDRAM/ 8 MB Flash	54	RS-232/RS-485 (including Self-Tuner)	3.5" TFT (Resolution 320 x 240 x 16)	Yes	Yes	Yes	Front Panel: IP65	+12 ~ 48 V_{DC}
VPD-130N		54					-		

* Image Storage Capacity strongly depends on the content and the size of images. The number in the table shows how many images in full screen size can be stored on the device.

Note:
Communication interface that is only for run time supports the following protocols:

I. For the case of RS-485, Modbus RTU Master and DCON Protocol

Master (for ICP DAS I-7000 series modules) are supported.
We provide API functions to open com port for sending/receiving strings through RS-485.

II. For the case of Ethernet, Modbus TCP Master is supported.
We provide API functions to sending/receiving strings through TCP.

USB is used for firmware update only.

2.1. TPD-28x Series

In contrast to the TPD-28xU series, TPD-28x series devices are not USB clients. Besides, TPD-28x series does not have SDRAM/Flash expansion.

Models	TPD-280	TPD-283
Image		
CPU Module		
CPU	32-bit RISC CPU	
Buzzer	Yes	

Rotary Switch (0~9)	Yes	
Communication Interface		
Ethernet	-	RJ-45 x 1, 10/100 Base-TX
Serial Port	RS-485 (including Self-Tuner)	-
MMI (Main Machine Interface)		
LCD	2.8” TFT (Resolution 240 x 320 x 16), defective pixels <= 3	
Backlight Life	20,000 hours	
Brightness	160 cd/m2	
Touch Panel	Yes	
Reset Button	Yes	
Electrical		
Power Input Range	+10 ~ 30 VDC	PoE (Power over Ethernet)
Power Consumption	1.2 W (50 mA @ 24 VDC)	IEEE 802.3af, Class 1
Mechanical		
Dimensions (WxLxH)	76mm (W) x 119mm (L) x 31mm (H)	
Installation	Wall Mount	
Environmental		
Operating Temperature	-20 ~ +70 °C	
Storage Temperature	-30 ~ +80 °C	
Ambient Relative Humidity	10 ~ 90% RH, non-condensing	

2.2. TPD-28xU Series

In contrast to the TPD-28x series, the TPD-28xU series devices are USB clients for the purpose of firmware update. This is the meaning of the **U** in the TPD-28x**U** series. Moreover, the TPD-28xU series has SDRAM/Flash expansion.

Models	**TPD-280U**
Image	
CPU Module	
CPU	32-bit RISC CPU
Memory Expansion	16 MB SDRAM / 8 MB Flash
Real Time Clock (RTC)	Yes
Buzzer	Yes
Rotary Switch (0~9)	Yes
Communication Interface	
Serial Port	RS-485 (including Self-Tuner)

USB 1.1 Client	Firmware updates only
MMI (Main Machine Interface)	
LCD	2.8” TFT (Resolution 240 x 320 x 16), defective pixels <= 3
Backlight Life	20,000 hours
Brightness	160 cd/m2
Touch Panel	Yes
Reset Button	Yes
Electrical	
Power Input Range	+10 ~ 30 VDC
Power Consumption	1.2 W (50 mA @ 24 VDC)
Mechanical	
Dimensions (WxLxH)	76mm (W) x 119mm (L) x 31mm (H)
Installation	Wall Mount
Environmental	
Operating Temperature	-20 ~ +70 °C
Storage Temperature	-30 ~ +80 °C
Ambient Relative Humidity	10 ~ 90% RH, non-condensing

2.3. TPD-43x Series

This series is 4.3” touch screen HMI devices.

Models	**TPD-430**	**TPD-430-EU**
Image		
CPU Module		
CPU	32-bit RISC CPU	
Memory Expansion	16 MB SDRAM / 8 MB Flash	

Real Time Clock (RTC)	Yes	
Speaker	Yes	
Rotary Switch (0~9)	Yes	
Communication Interface		
Serial Port	RS-485 (including Self-Tuner)	
USB 1.1 Client	Firmware updates only	
MMI (Main Machine Interface)		
LCD	4.3" TFT(Resolution 480 X 272 X 16), defective pixels <= 3	
Backlight Life	20,000 hours	
Brightness	400 cd/m2	
Touch Panel	Yes	
LED Indicator	Yes	
Reset Button	Yes	
Electrical		
Power Input Range	+10 ~ 30 VDC	
Power Consumption	2.5 W (104 mA @ 24 VDC)	
Mechanical		
Dimensions (WxLxH)	126mm(W) x 82mm(L) x 24mm(H)	126mm(W) x 92mm(L) x 29mm(H)
Installation	Wall Mount (Suitable for the outlet box in United States)	Wall Mount (Suitable for the European 86mm x 86mm outlet box)
Environmental		
Operating Temperature	-20 ~ +70 °C	
Storage Temperature	-30 ~ +80 °C	
Ambient Relative Humidity	10 ~ 90% RH, non-condensing	

2.4. VPD-13x Series

VPD series devices are designed for industrial applications.

Models	VPD-130	VPD-130N

Image		
CPU Module		
CPU	32-bit RISC CPU	
Memory Expansion	16 MB SDRAM / 8 MB Flash	
Real Time Clock (RTC)	Yes	
Buzzer	Yes	
Rotary Switch (0~9)	Yes	
Communication Interface		
Serial Port	One set of RS-232/ RS-485, including Self-Tuner	
USB 1.1 Client	Firmware updates only	
MMI (Main Machine Interface)		
LCD	3.5" TFT (Resolution 240 x 320 x 16), defective pixels <= 3	
Backlight Life	20,000 hours	
Brightness	270 cd/m2	
Touch Panel	Yes	
LED Indicator	Yes	-
Reset Button	Yes	
Rubber Keypad	5 keys (Programmable)	-
Electrical		
Power Input Range	+12 ~ 48 VDC	
Power Consumption	2 W (83 mA @ 24 VDC)	
Mechanical		
Dimension	103 mm (W) x103 mm (L) x 53mm (H)	
Ingress Protection	Front Panel: IP65	
Installation	DIN-Rail Mount and Panel Mount	
Environmental		
Operating Temperature	-20 ~ +70 °C	
Storage Temperature	-30 ~ +80 °C	

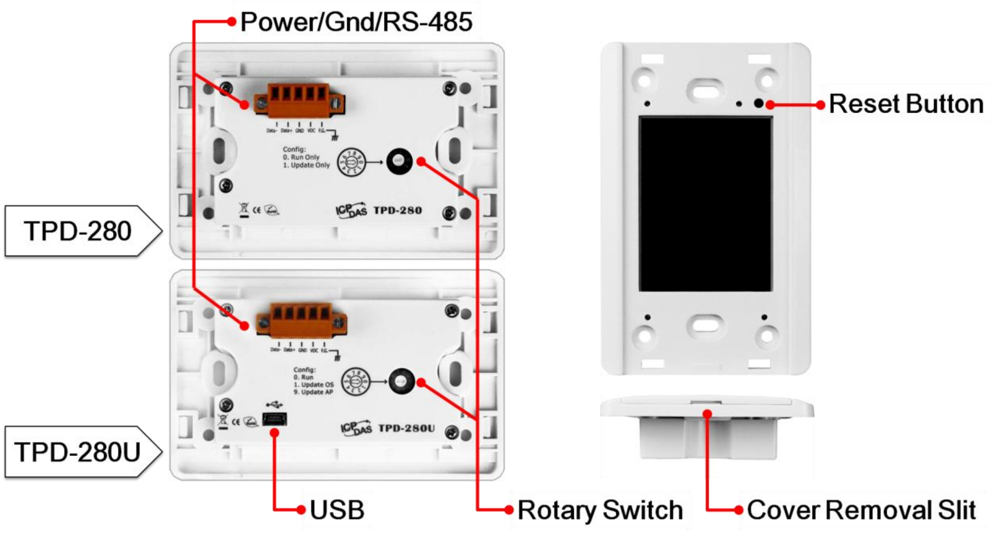
Ambient Relative Humidity	10 ~ 90% RH, non-condensing

3. Hardware

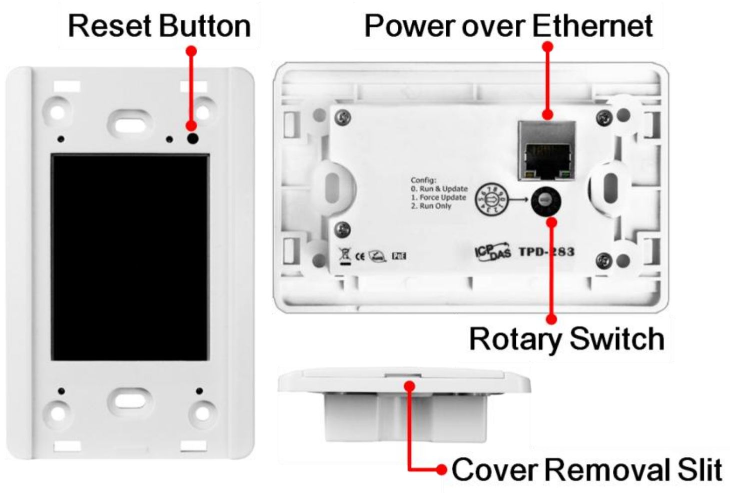
This chapter shows the overviews, dimensions, etc. of the TouchPAD devices.

3.1. Hardware Appearance

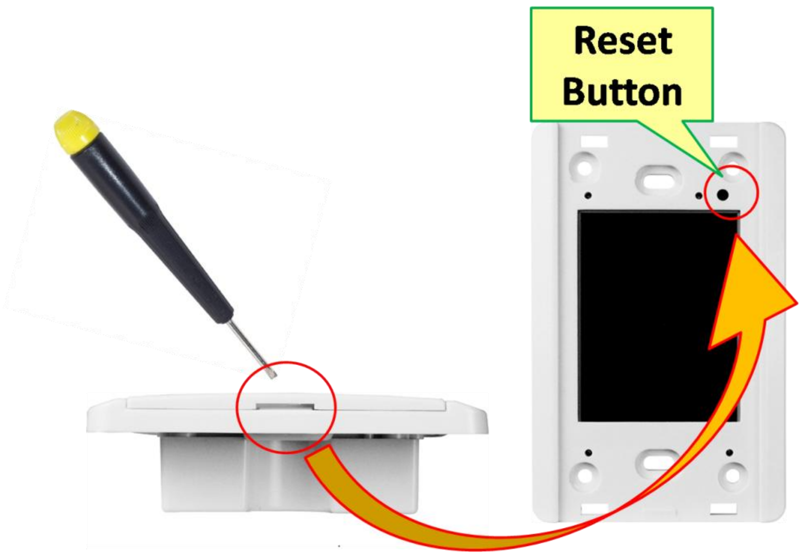
TPD-280/TPD-280U



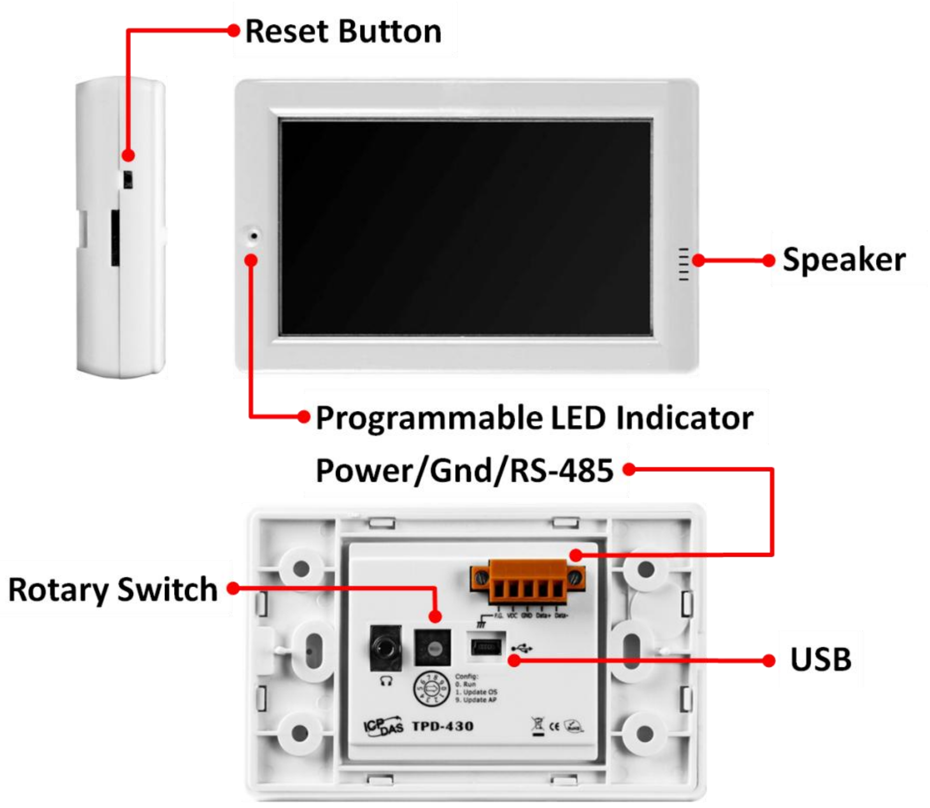
TPD-283



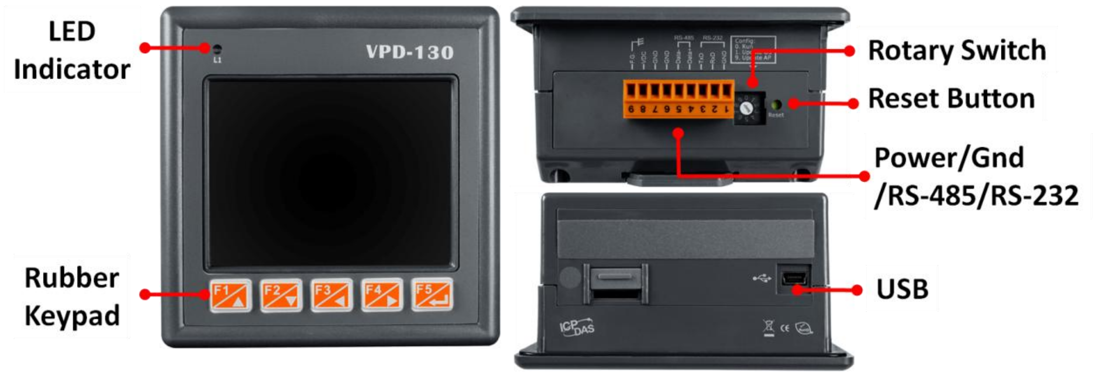
Where is the reset button?



TPD-430/TPD-430-EU

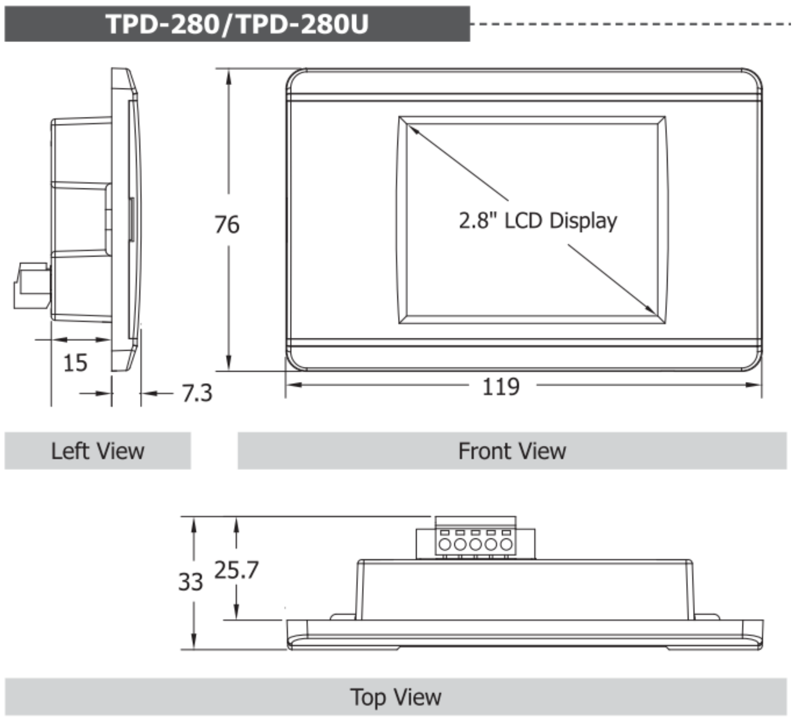


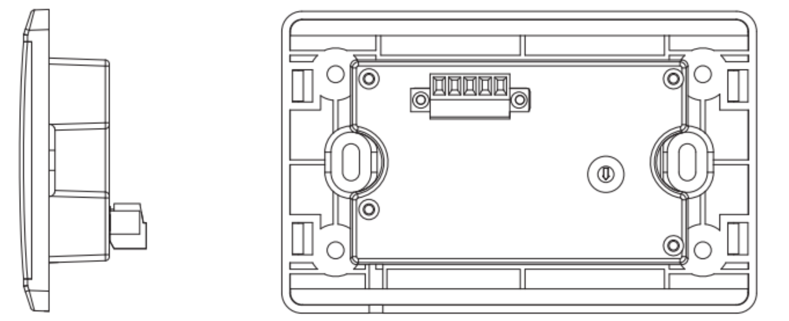
VPD-130/VPD-130N



3.2. Dimensions

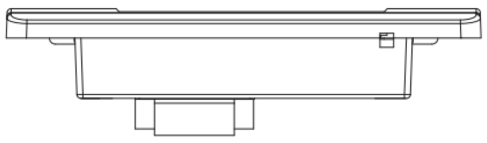
TPD-280/TPD-280U (unit: mm)





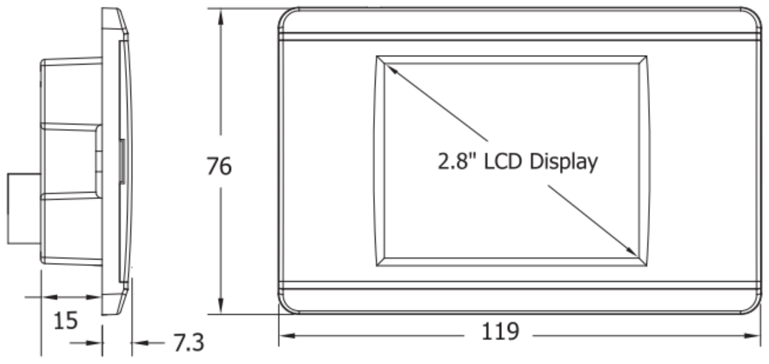
Right View

Rear View



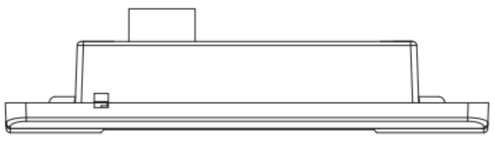
Bottom View

TPD-283 (unit: mm)

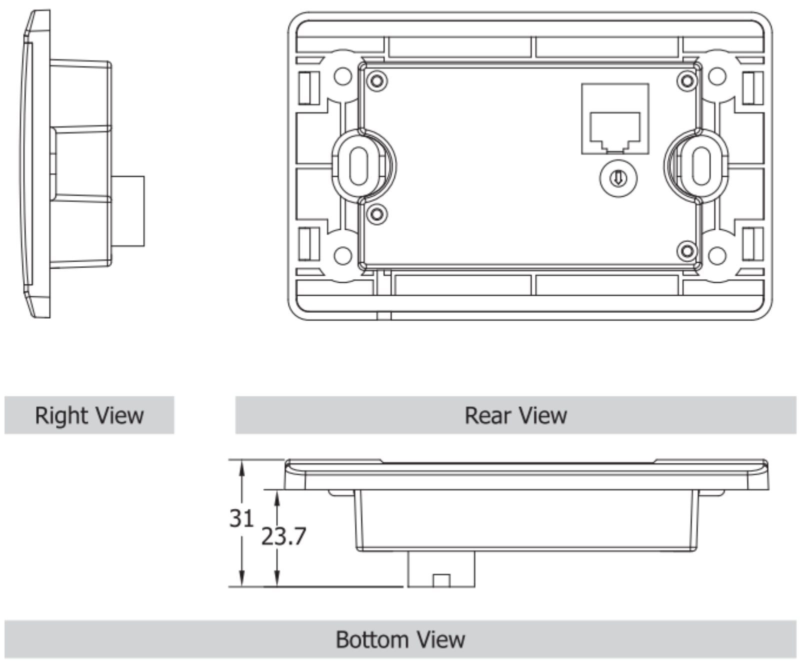


Left View

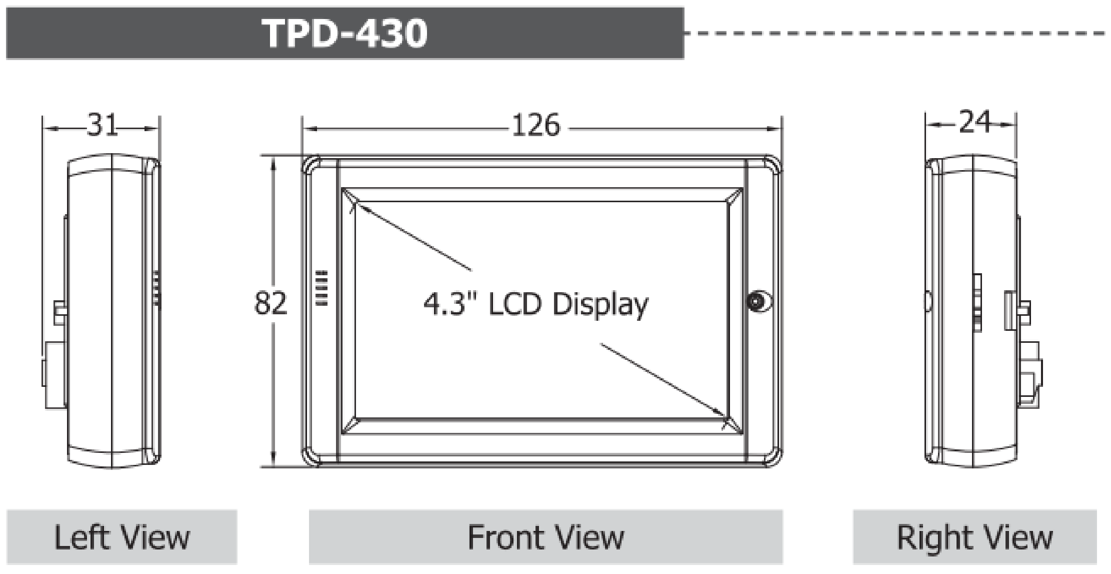
Front View

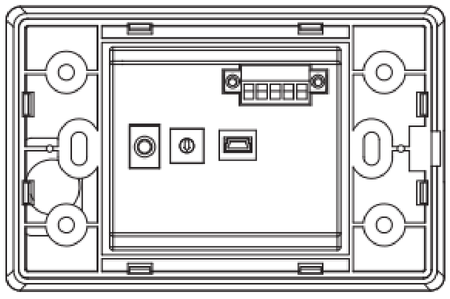


Top View

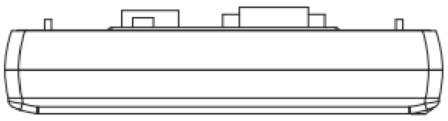


TPD-430/TPD-430-EU (unit: mm)

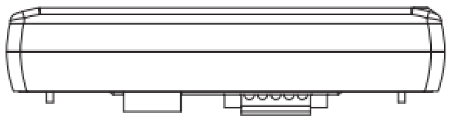




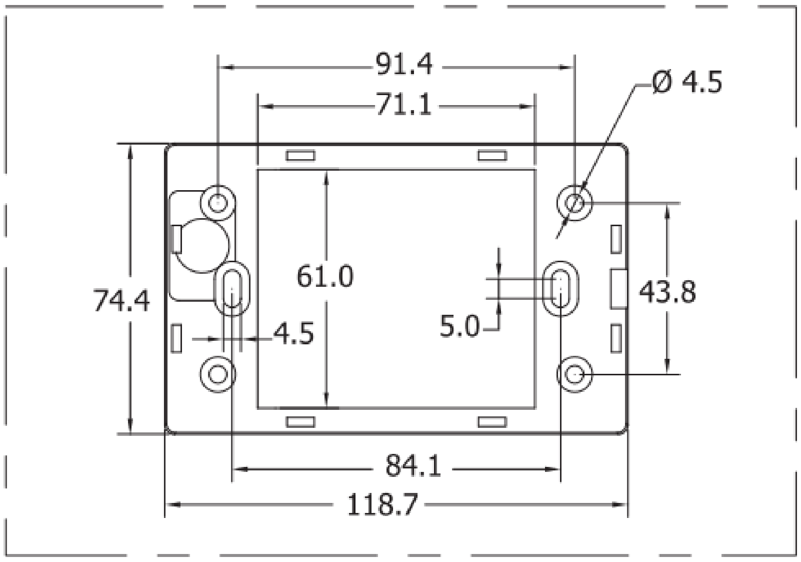
Rear View



Top View

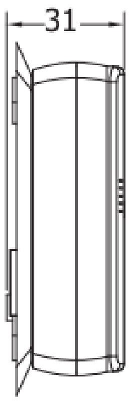


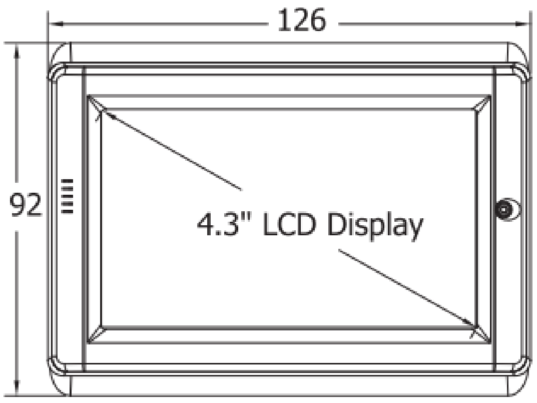
Bottom View

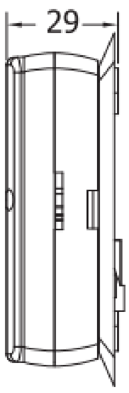


Wall Mounting

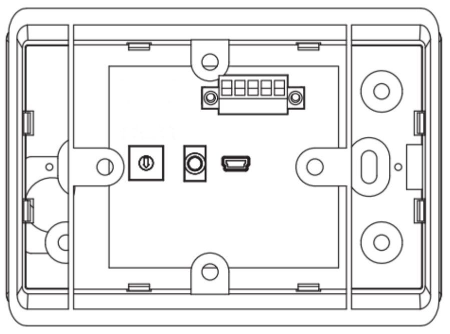
TPD-430-EU



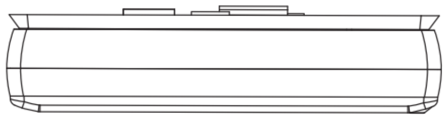




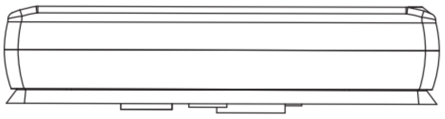
Left View Front View Right View



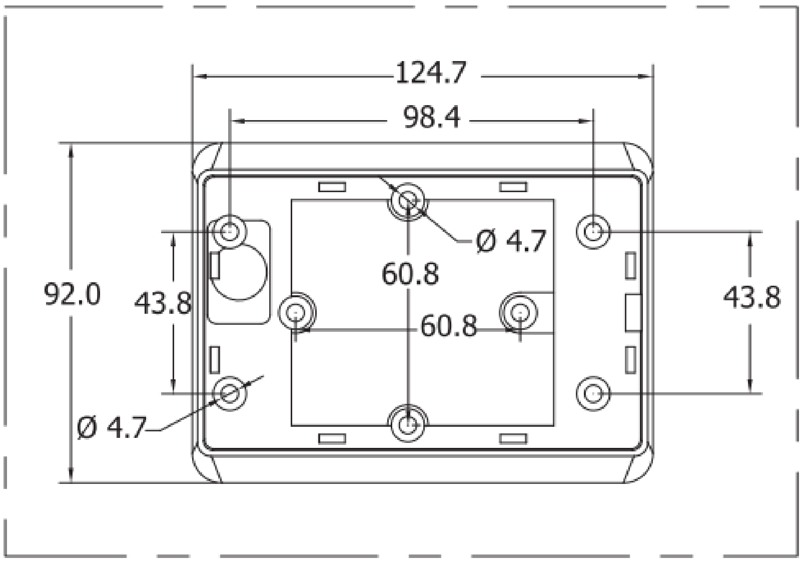
Rear View



Top View

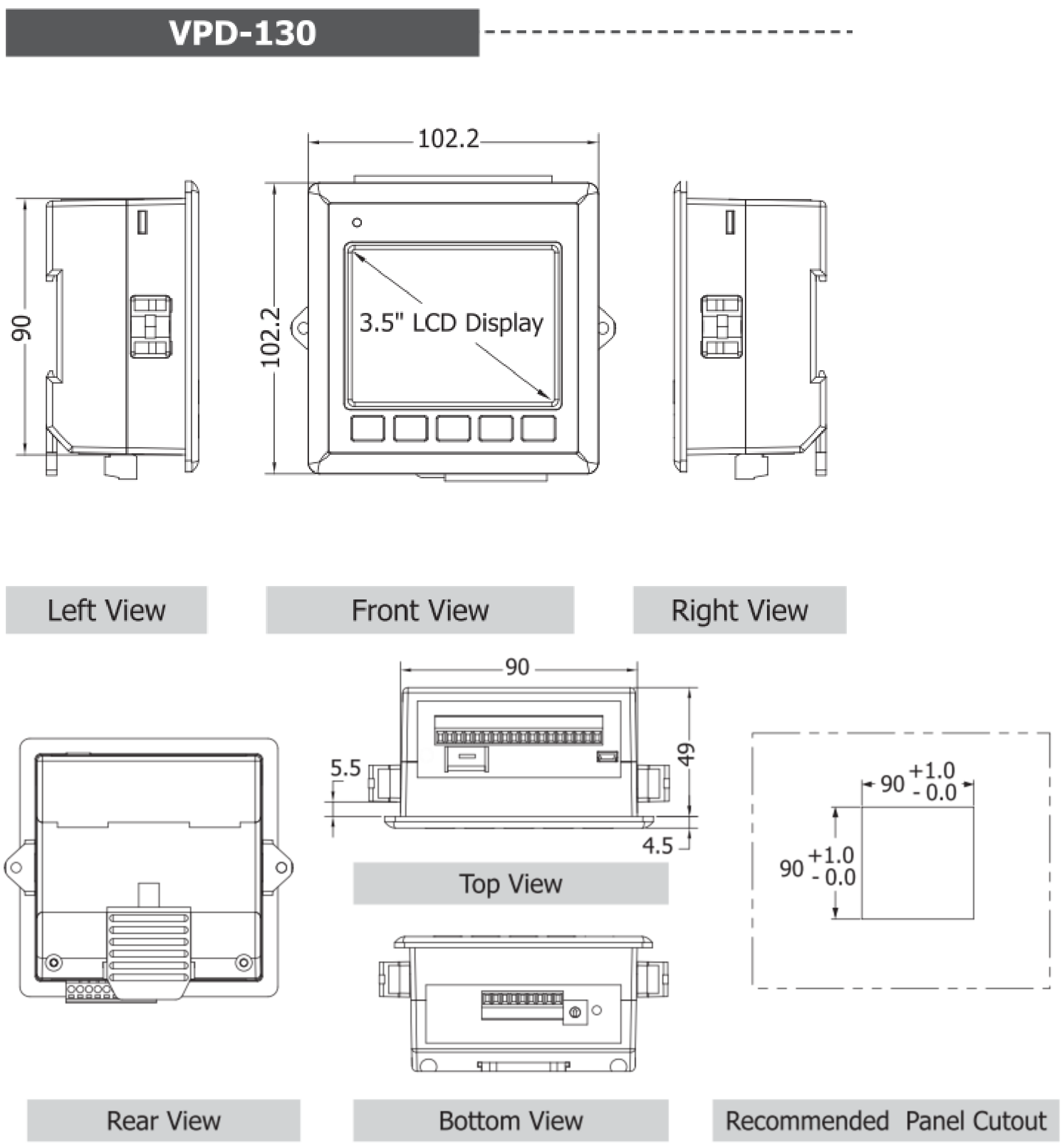


Bottom View

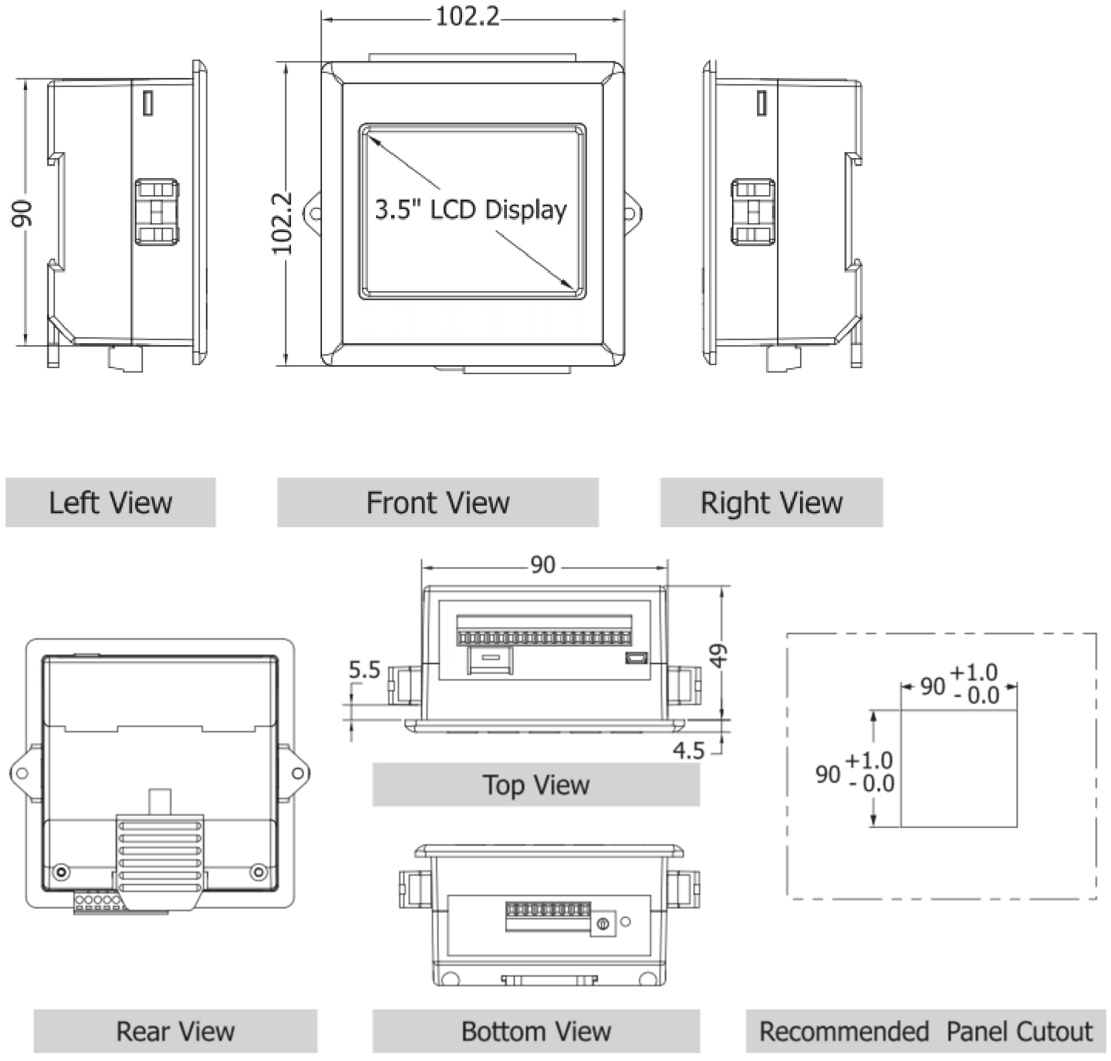


Wall Mounting

VPD-130/VPD-130N (unit: mm)



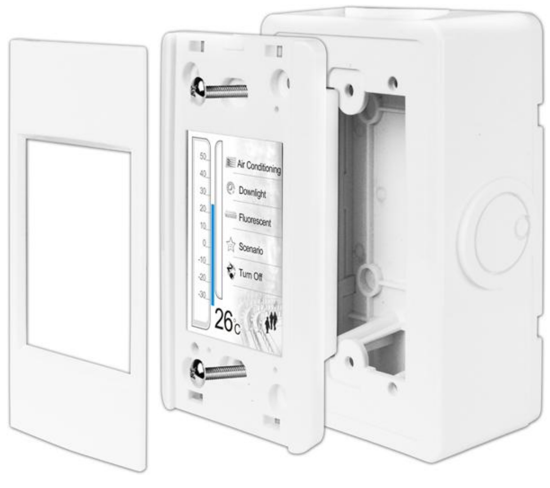
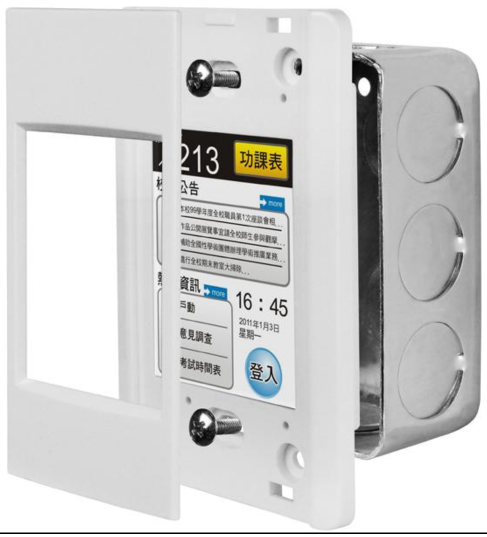
VPD-130N



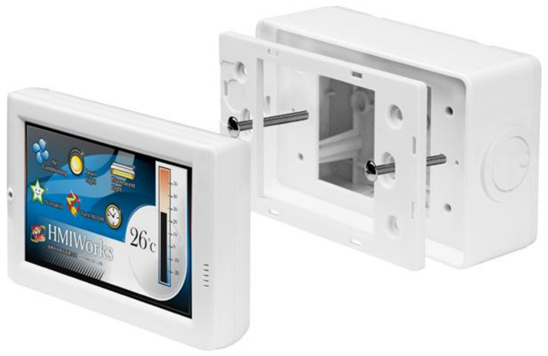
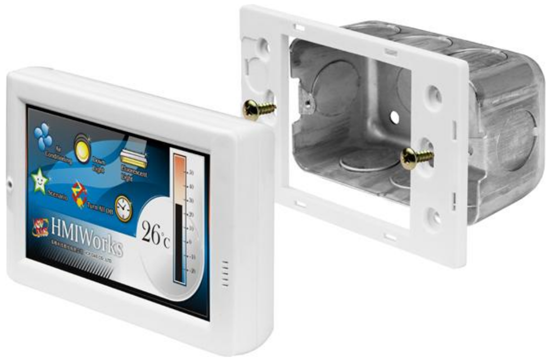
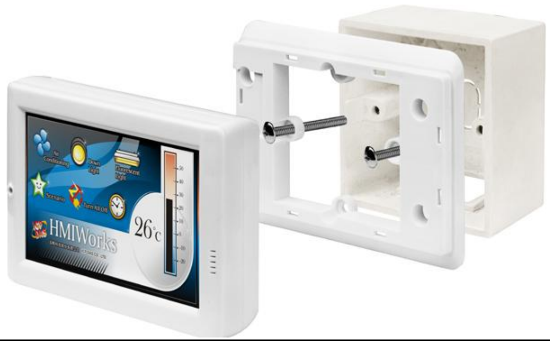
3.3. Installation and Wiring

Mount the hardware

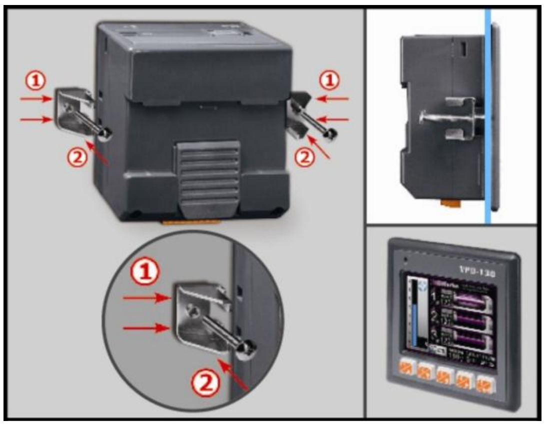
For TPD-280/TPD-280U/TPD-283:

TPD-280/TPD-280U with External Wall Box, EWB-T28 (optional)	TPD-280/TPD-280U with Outlet Box, OB120 (optional)
	

For TPD-430/TPD-430-EU:

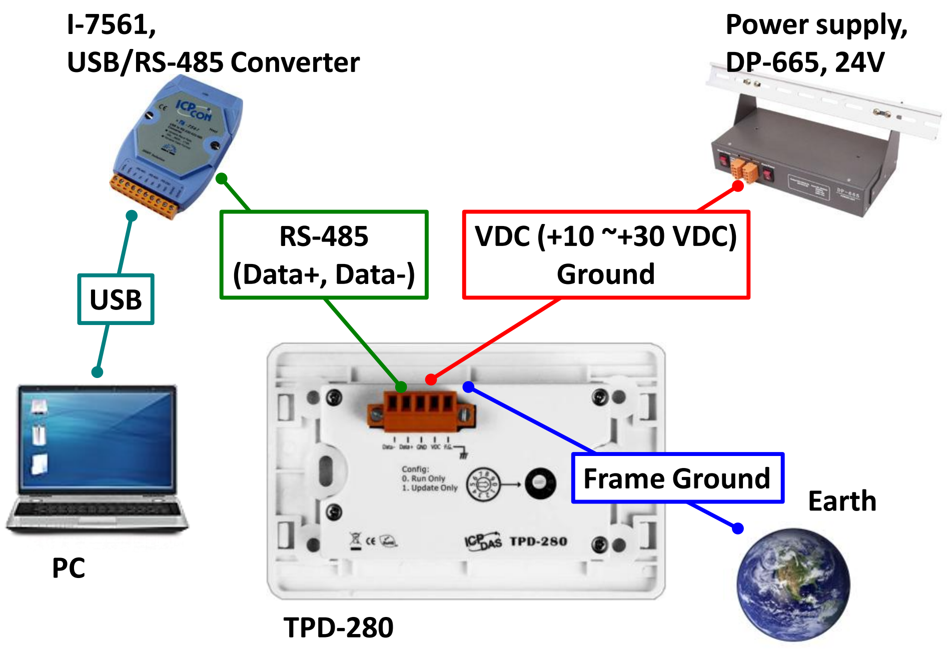
TPD-430 with External Wall Box, EWB-T43 (optional)	TPD-430 with Outlet Box, OB120 (optional)
	
TPD-430-EU for European 86 x 86 mm outlet box 	

For VPD-130/VPD-130N:

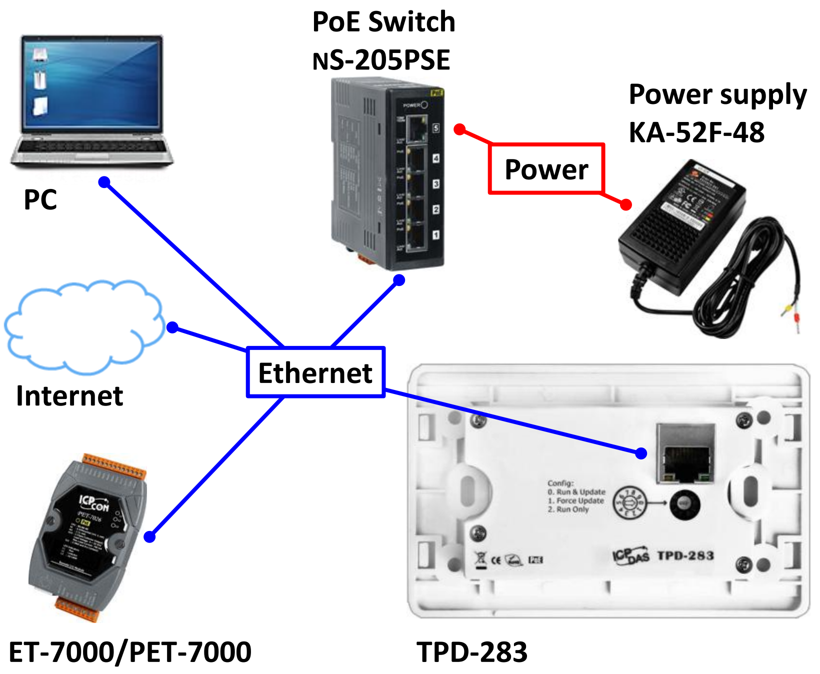
The DIN-rail mounting of VPD-130/VPD-130N	The panel mounting of VPD-130/VPD-130N
	

Connect to power and network

TPD-280 (Applications are downloaded through RS-485.)



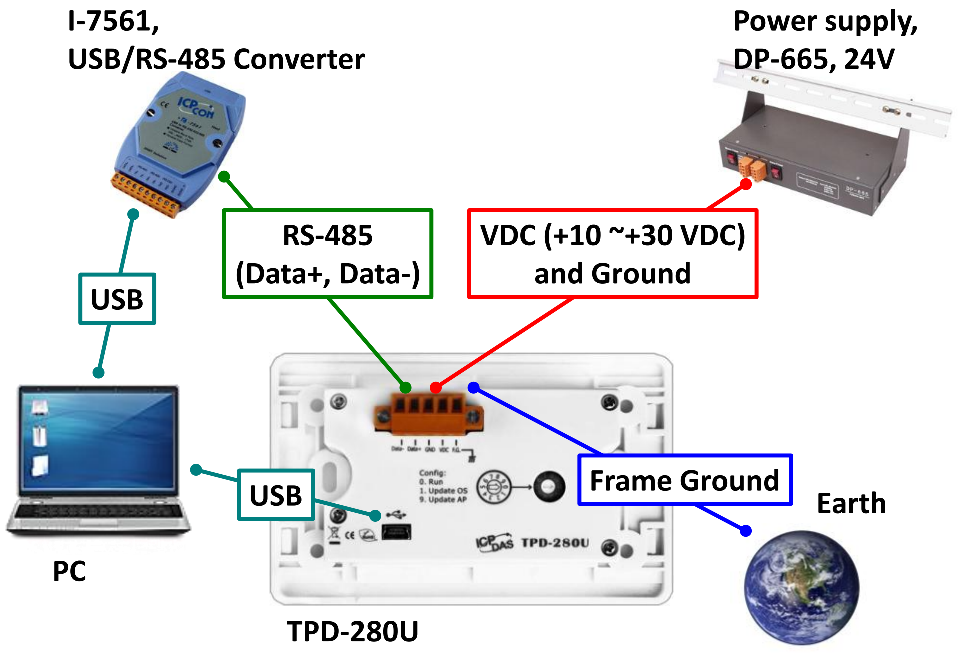
TPD-283 (Applications are downloaded through Ethernet.)



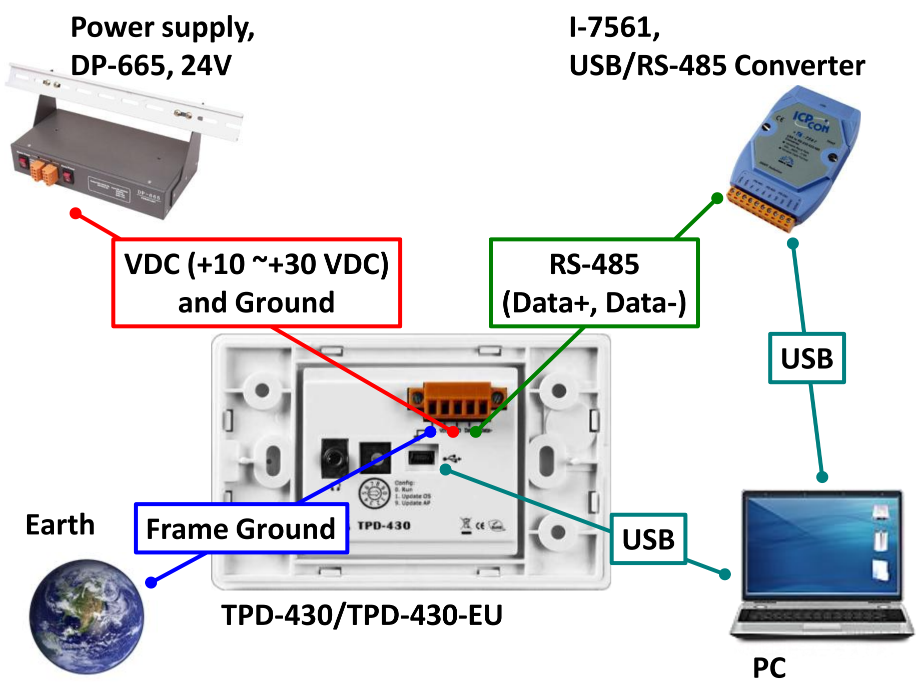
** **Note**: either "Ethernet" or "PoE" uses the same general Ethernet cable.

** PoE, power over Ethernet, means that the Ethernet cable conveys not only data but also power.

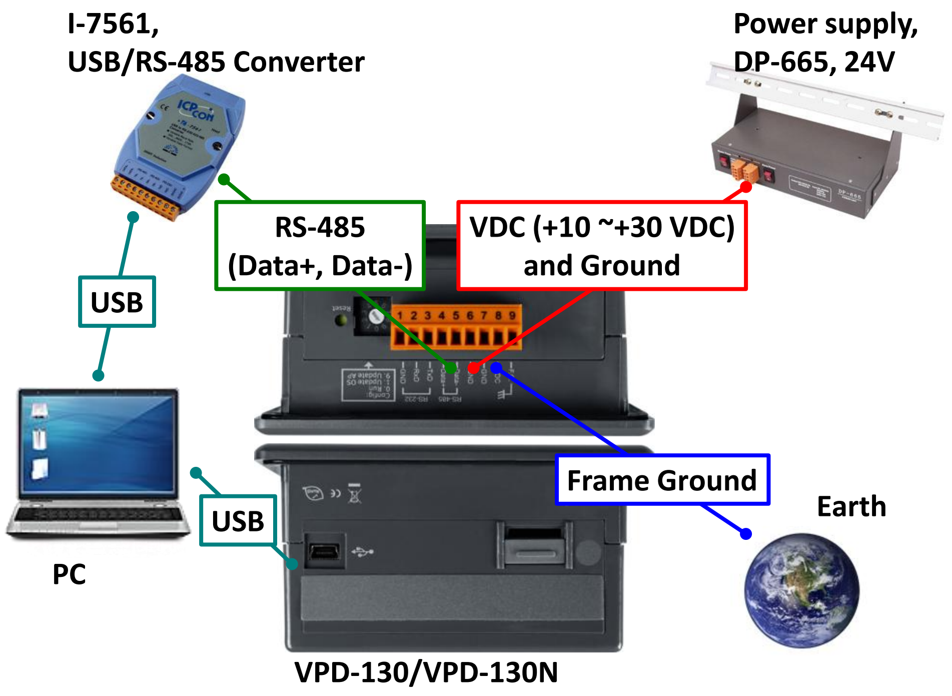
TPD-280U (Applications are downloaded through **USB only**.)



TPD-430/TPD-430-EU (Applications are downloaded through **USB only**.)



VPD-130/VPD-130N (Applications are downloaded through **USB only**.)



The pin assignments

The pin assignments of the TPD-280/ TPD-280U/ TPD-283/ TPD-430/ TPD-430-EU devices:

No	Mode	Description
0	F.G.	Frame Ground. F.G. is connected to the inside EMI or ESD suppression circuits. Make sure that F.G. is connected to the Earth
1	VDC	DC input Voltage (range: +10V ~ +30V)
2	GND	Connected to the power supply's ground pin
3	Data+	The positive data line of the RS-485 network
4	Data-	The negative data line of the RS-485 network

The pin assignments of the VPD-130/ VPD-130N devices:

No	Mode	Description
0	F.G.	Frame Ground. F.G. is connected to the inside EMI or ESD suppression circuits. Make sure that F.G. is connected to the Earth
1	VDC	DC input Voltage (range: +12V ~ +48V)
2	GND	Connected to the power supply's ground pin
3	Data+	The positive data line of the RS-485 network
4	Data-	The negative data line of the RS-485 network
5	TxD	The pin of transmitted data of the RS-232
6	RxD	The pin of received data of the RS-232
7	GND	The common ground of the RS-232

Note: the RS-485 and the RS-232 use the same serial port on the VPD-130/ VPD-130N devices.

4. Set up Devices and Connect to I/O

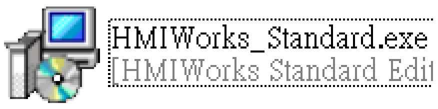
This chapter is divided into two parts. One is setup TouchPAD and the other is connecting TouchPAD to I/O modules.

4.1. Preparation

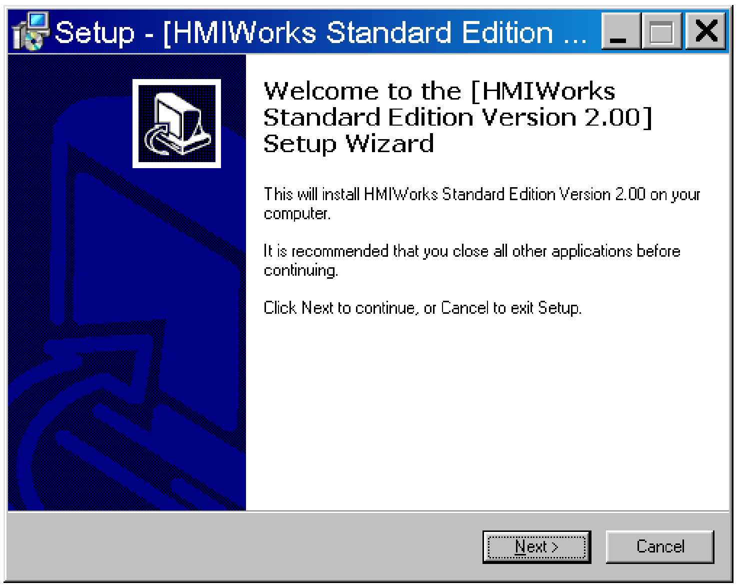
First of all, you should install the HMIWorks development software on your PC. HMIWorks is the development tools for the TouchPAD devices.

Follow the steps below to install the HMIWorks:

1. Double click the icon to install.


HMIWorks_Standard.exe
[HMIWorks Standard Edit

2. Simply follow the instructions to finish the installation.



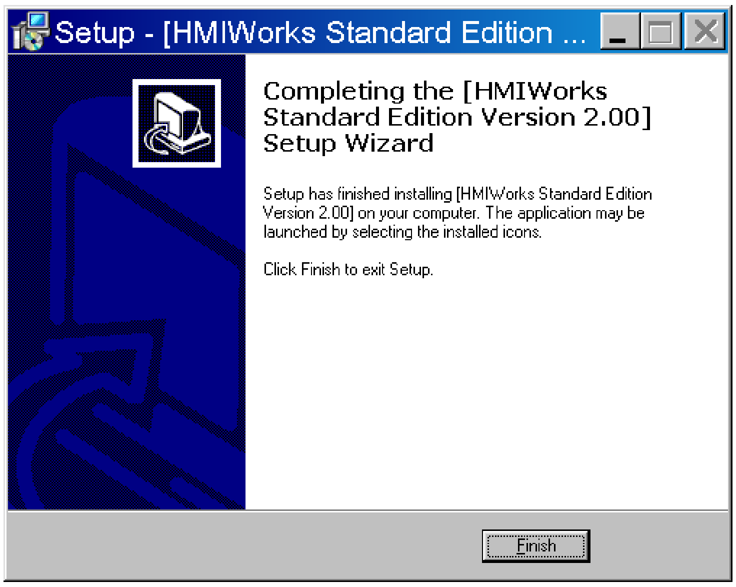
Welcome to the [HMIWorks Standard Edition Version 2.00] Setup Wizard

This will install HMIWorks Standard Edition Version 2.00 on your computer.

It is recommended that you close all other applications before continuing.

Click Next to continue, or Cancel to exit Setup.

3. The snapshot of **Finish**.



Completing the [HMIWorks Standard Edition Version 2.00] Setup Wizard

Setup has finished installing [HMIWorks Standard Edition Version 2.00] on your computer. The application may be launched by selecting the installed icons.

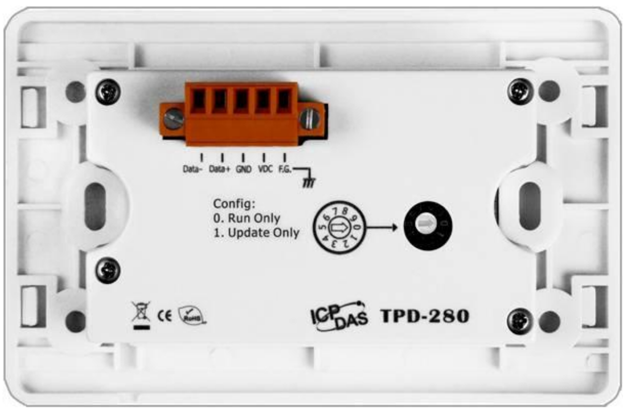
Click Finish to exit Setup.

4.2. Setup Devices

The TouchPAD devices are divided into several groups. Before downloading programs to the TouchPAD device, the TouchPAD device must be set up. We describe how to set up each kind of the TouchPAD devices in the following sections.

4.2.1. Setup the TPD-280 devices

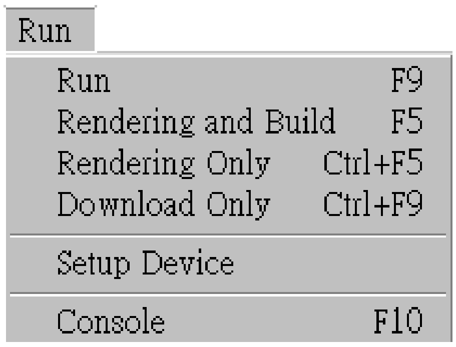
Configuration mode:



On the back panel of the TPD-280 device, configuration modes can be found. Use the rotary switch to set the configuration mode.

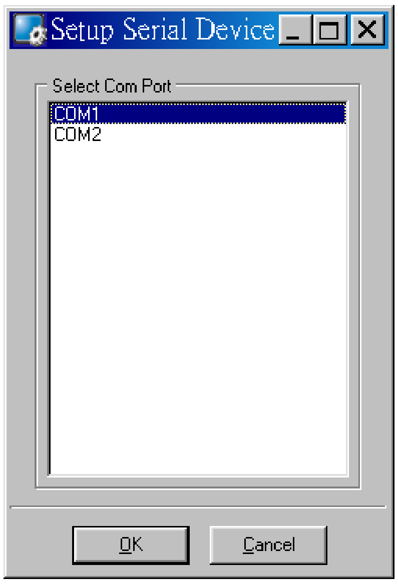
No	Mode	Description
0	Run Only	This mode is used for running programs.
1	Update Only	This mode is used for updating programs.

Click the “**Setup Device**” option from the “**Run**” menu of the HMIWorks software.



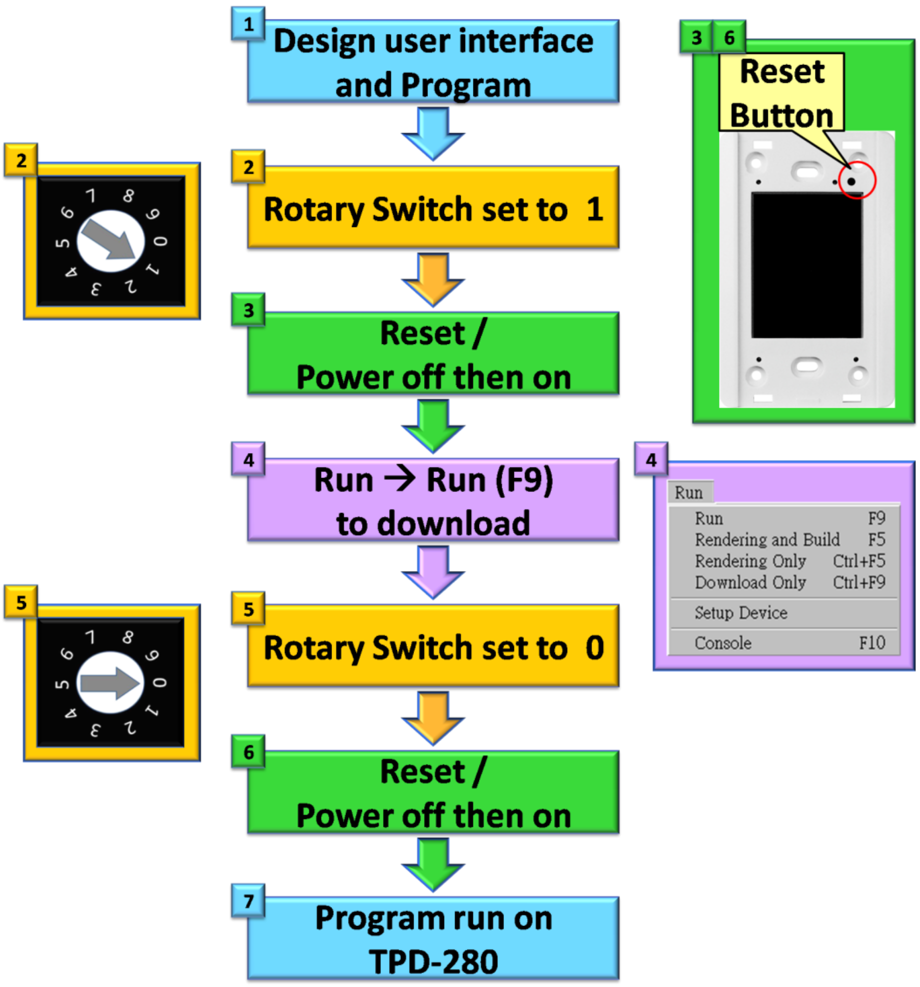
The TPD-280 device uses the RS-485 network as its communication method. It is not able to connect through the Ethernet network.

Select the com port that connects to the TPD-280 device.
Before downloading programs to the TouchPAD device, be sure to set up the TouchPAD device (TPD-280) to connect to it first.



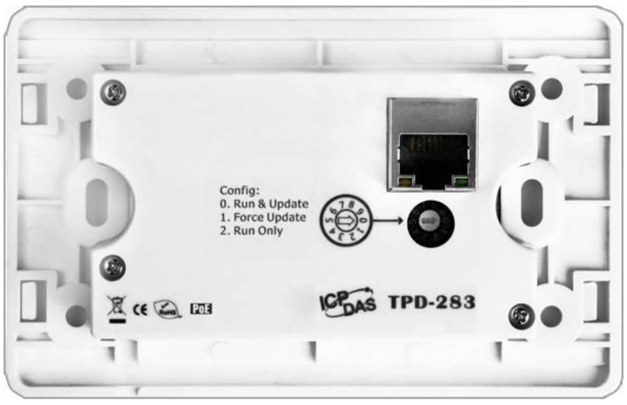
Downloading programs to the TPD-280 device

Downloading programs to a TPD-283 device is easy. Just click on the "**Run**" option or the "**Download Only**" option from the "**Run**" menu. However, downloading programs to a TPD-280 device is a little complicated. As shown in the figure below, set the rotary switch to "1" when downloading the program and set the rotary switch back to "0" when finishing downloading and let the program run.



4.2.2. Setup the TPD-283 devices

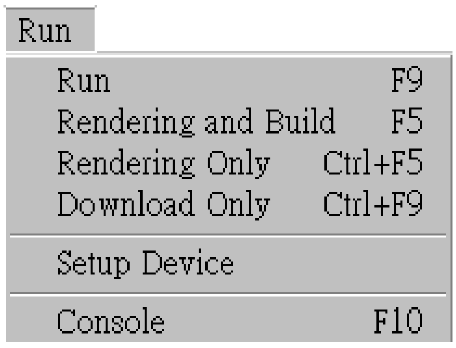
Configuration mode:



On the back panel of a TPD-283 device, configuration modes can be found. Use the rotary switch to set the configuration mode.

No	Mode	Description
0	Run & Update	This is a special run mode which is used in the development stage. The TouchPAD (TPD-283) devices can be updated by a PC from the remote side through Ethernet.
1	Force Update	While the application run on the TouchPAD device seriously crashes, use this mode to update an new application to the TouchPAD device.
2	Run Only	Simply run, a TouchPAD device cannot be updated in this mode.

Click the "**Setup Device**" option from the "**Run**" menu.



TPD-283 uses Ethernet as its communication method. It is not able to connect through RS-485 network (since it doesn't have).

Before downloading programs to the TouchPAD (TPD-283) devices, be sure to set up the TouchPAD device to connect to it. **The IP configuration of the**

TPD-283 device is not stored directly in the flash memory. It is a part of the program image which is built by the HMIWorks software. Every time a program is downloaded into the TPD-283 device, it also updates the IP settings of the TPD-283 device.

Default IP settings of the TPD-283 device

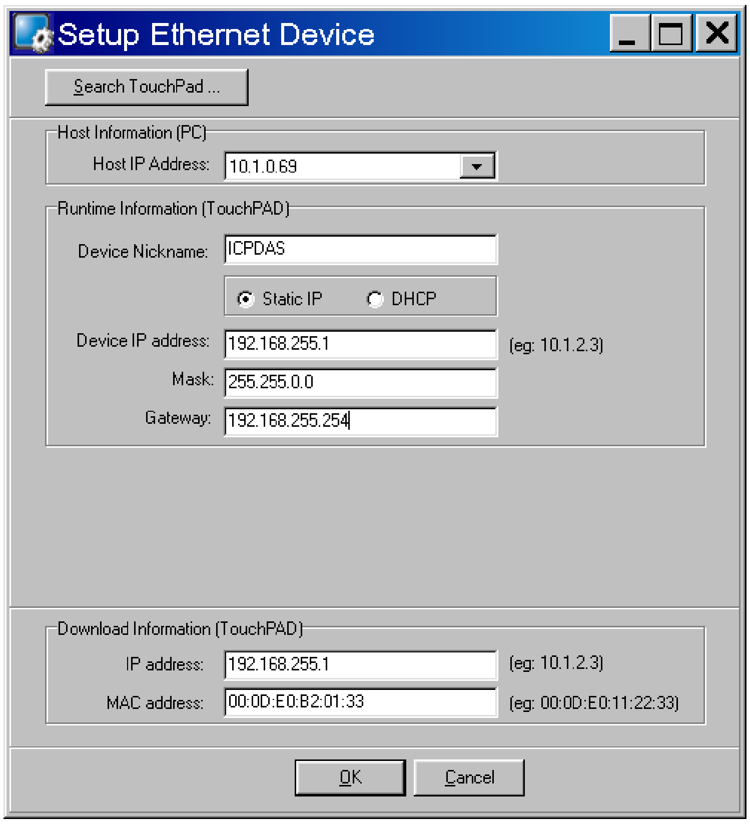
Item	Value
IP	192.168.255.1
Type	Static IP

The IP settings of a TPD-283 device can be classified in one of two types: "DHCP" or "Static IP".

Type	Description
DHCP	The TPD-283 device is assigned an IP address from the DHCP server every time it is turned on (reset).
Static	The TPD-283 device has a static, unchanged IP address.

Users can change the type of IP settings by downloading a new program into the TPD-283 device.

1. Click the "**Setup Device**" option from the "**Run**" menu, then click the **"Search TouchPad …"** button in the displayed "**Setup Ethernet Device**" window to find the TouchPAD (TPD-283) device on the network.
2. If the TouchPAD (TPD-283) device is found and displayed in the list on the "**Search TouchPAD**" dialog box, double click on the TouchPAD (TPD-283) item in the list to bring the information back to the "**Setup Ethernet Device**" window.
3. Select the IP Address type, "DHCP" or "Static IP", for the new program and then press "**OK**". Click the "**Run**" option from the "**Run**" menu to download the new program to the TouchPAD (TPD-283) device. (We will introduce the details below.)
4. Note: The new IP settings take effect only when the downloading is successful because the IP settings are stored in a part of the program image.



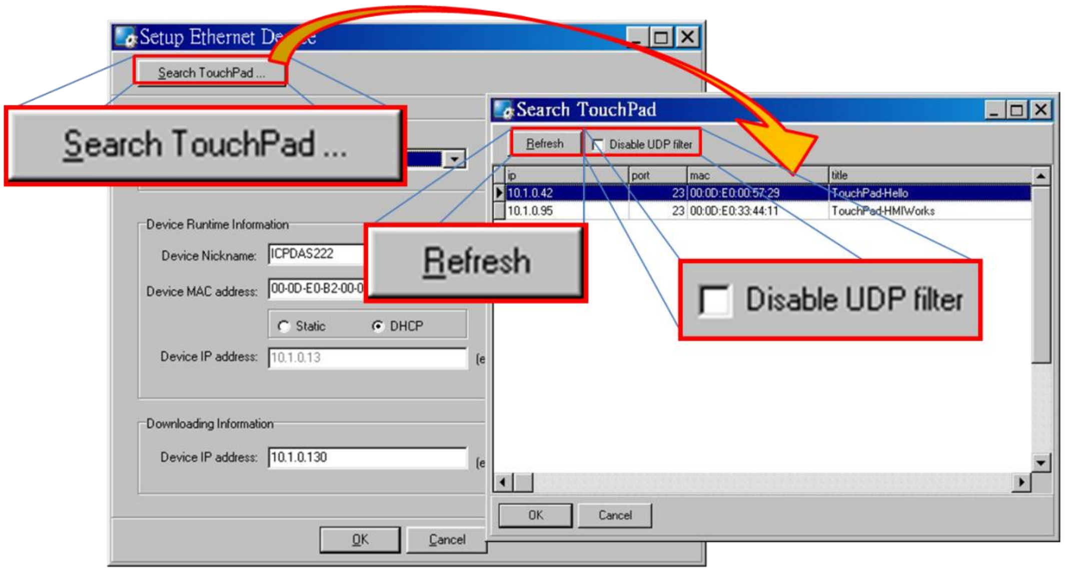
Host Information (PC)
Host IP Address: 10.1.0.69

Runtime Information (TouchPAD)
Device Nickname: ICPDAS
[✓ Static IP] DHCP
Device IP address: 192.168.255.1 (eg: 10.1.2.3)
Mask: 255.255.0.0
Gateway: 192.168.255.254

Download Information (TouchPAD)
IP address: 192.168.255.1 (eg: 10.1.2.3)
MAC address: 00:0D:E0:B2:01:33 (eg: 00:0D:E0:11:22:33)

item	description
Search TouchPAD	Search for the TouchPAD devices on the network. Make sure that the TouchPAD devices and the local computer are in the same subnet.
Host IP Address	The IP address of the local computer
Device Nickname	The nickname used to identify the TouchPAD device which is selected in the list on the "**Search TouchPAD**" window. This nickname is part of the program image and it takes effect after the new program runs (downloading successful).
Type of IP	Static IP or DHCP
Device IP Address (in the "Runtime Information" group)	The IP address of the TouchPAD device which is used in the runtime of the program. The IP address in the runtime is part of the program and it takes effect after the new program runs (downloading successful).

Mask	The subnet mask for the TouchPAD
Gateway	The gateway address for the TouchPAD. The gateway address is the IP address for a network interface on a router that leads to a larger network.
Device IP Address (in the “Download Information” group)	The IP address of the TouchPAD which is used only when downloading programs. This IP address information is NOT part of the program image, every time the downloading process starts, HMIWorks assigns this IP address just for downloading only.
MAC address	The MAC address of the TouchPAD device which is selected in the “**Search TouchPAD**” window. Every TouchPAD device is shipped with its MAC information pasted on its back panel.



Device Runtime Information
Device Nickname: ICPDAS222
Device MAC address: 00-0D-E0-B2-00-0
( ) Static (●) DHCP
Device IP address: 10.1.0.13

Downloading Information
Device IP address: 10.1.0.130

Search TouchPad

ip	port	mac	title
10.1.0.42	23	00:0D:E0:00:57:29	TouchPad-Hello
10.1.0.95	23	00:0D:E0:33:44:11	TouchPad-HMIWorks

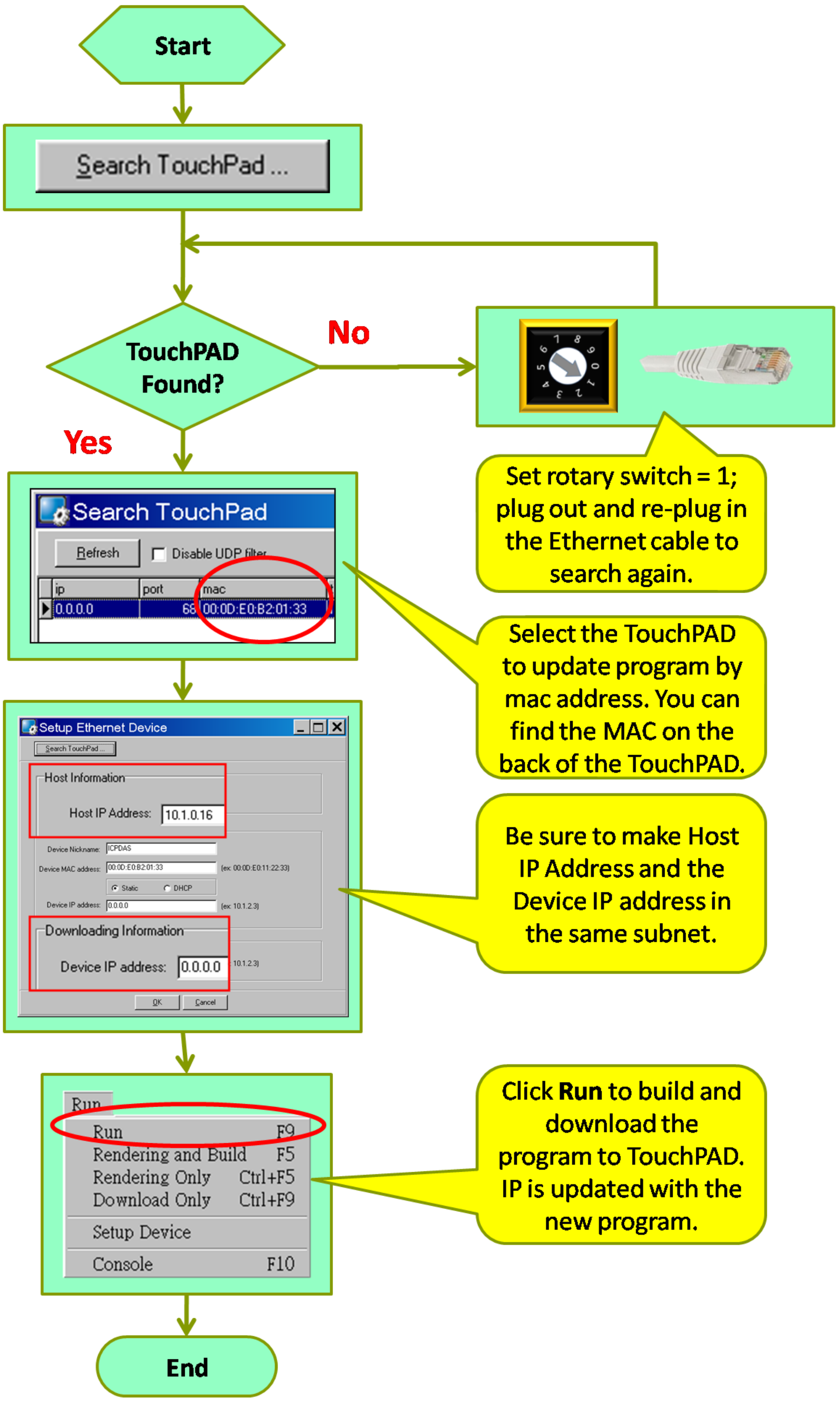
item	description
Refresh	Re-search again to re-make the list.
Disable UDP filter	We have UDP filter enabled by default to search for the TouchPAD devices only. Devices which are not TouchPAD are filtered out if this option is not checked.

Press the **“Search TouchPAD”** button to search the TPD-283 device.

Note1: The MAC address can be found on the back panel of the TPD-283 device. HMIWorks uses this MAC address to search for the TouchPAD device. To see if the TouchPAD device is on the network, check that if there is a device with the MAC address in the list after searching.

Note2: Be sure to put the TPD-283 device and your PC in the same subnet.

In short, we draw the flow chart of setup the TPD-283 devices:



Host Information
Host IP Address: 10.1.0.16
Device Nickname: ICPDAS
Device MAC address: 00:0D:E0:B2:01:33 (ex: 00:0D:E0:11:22:33)
[✓ Static] DHCP
Device IP address: 0.0.0.0 (ex: 10.1.2.3)
Downloading Information
Device IP address: 0.0.0.0 (ex: 10.1.2.3)
OK Cancel

Set rotary switch = 1; plug out and re-plug in the Ethernet cable to search again.

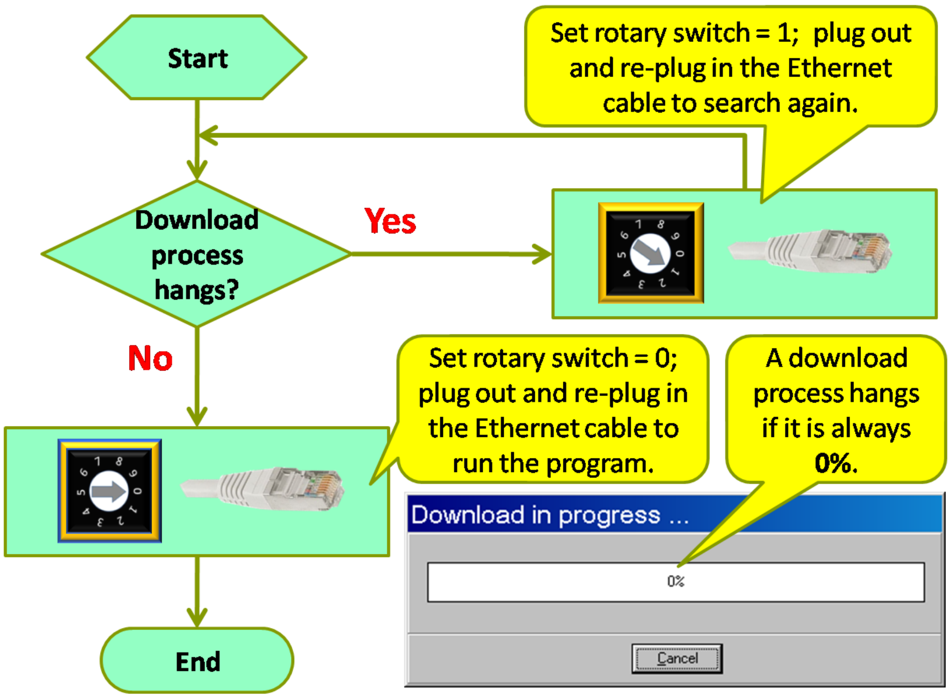
Select the TouchPAD to update program by mac address. You can find the MAC on the back of the TouchPAD.

Be sure to make Host IP Address and the Device IP address in the same subnet.

Click **Run** to build and download the program to TouchPAD. IP is updated with the new program.

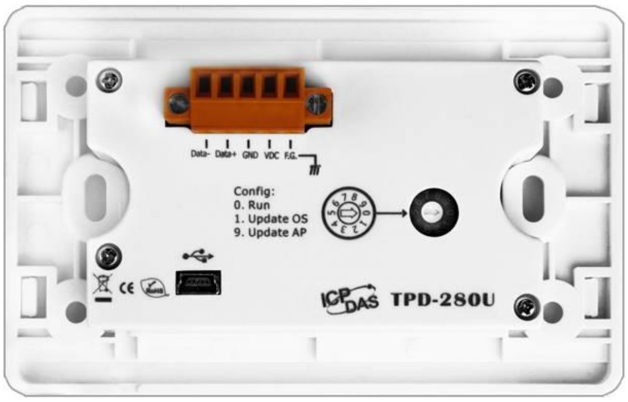
What to do if the download process hangs?

Anytime download process hangs, users can follow the flow below to complete the download process. (Note that below is not just for the case after setup device.)


Start
Set rotary switch = 1; plug out and re-plug in the Ethernet cable to search again.
Download process hangs?
Yes
No
Set rotary switch = 0; plug out and re-plug in the Ethernet cable to run the program.
A download process hangs if it is always 0%.
Download in progress ...
0%
Cancel
End

4.2.3. Setup Other Devices in TouchPAD Series

Configuration mode:



Except the TPD-280 and the TPD-283 devices, users can find out the same definitions of the configuration modes on their back panels for other devices in the TouchPAD series. We use the rotary switch to set the configuration mode.

Take the TPD-280U device for example as below.

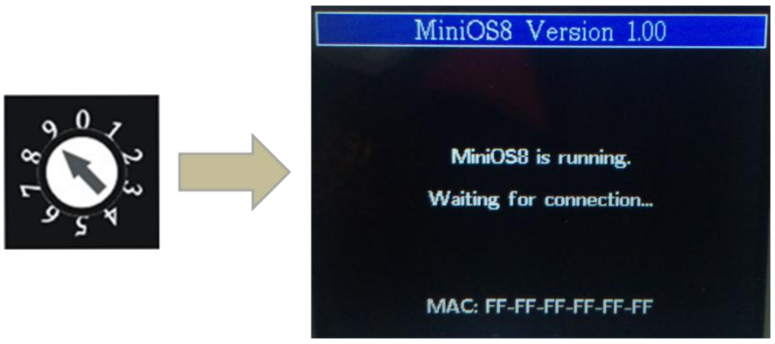
No	Mode	Description
0	Run	This mode is used to run the application. (There is only one application on a TouchPAD device.)
1	Update OS	This mode is used to update operating system of the TouchPAD device.
9	Update AP	This mode is used to download an application to the TouchPAD device. (There is only one application on a TouchPAD device.)

All devices in the TouchPAD series have USB ports, except the TPD-280 and the TPD-283 devices. HMIWorks can download a program through that USB port. Unlike TPD-280 and TPD-283, Users **need not** "Setup Device" from the "**Run**" menu but users must install the USB driver for TouchPAD on their PC first.

Note: Other means of downloading (such as through the RS-485 network) are not provided for the TouchPAD devices which have a USB port on themselves.

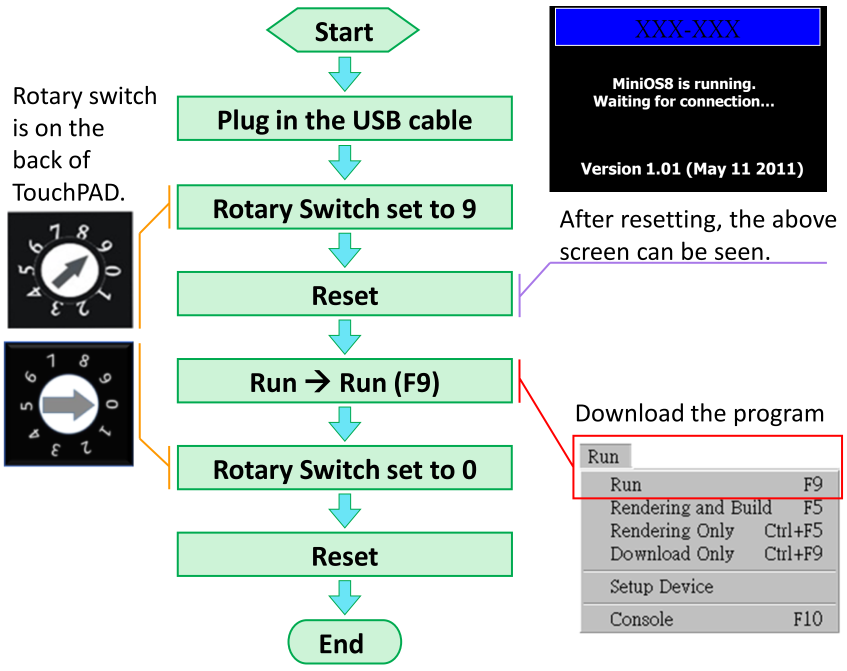
Installing the TouchPAD USB Driver on your PC

1. If HMIWorks version 2.03 or above has been already installed on your PC, the TouchPAD USB driver has also been automatically installed, too. However, users may need to update the TouchPAD USB driver manually if some previous version of HMIWorks was installed.
   HMIWorks setup file: ftp://ftp.icpdas.com/pub/cd/touchpad/setup/
2. To update the TouchPAD USB driver, use the USB driver located in the below directory to update the driver in the device manager from the control panel.
   C:\ICPDAS\HMIWorks_Standard\Tools\USB_Drivers
   ("C:\ICPDAS\HMIWorks_Standard\" is the installation path of the HMIWorks software.)
3. In order to update a USB driver for the TouchPAD devices, set the rotary switch on the TouchPAD device to the "9" position, then plug the USB cable into the TouchPAD Device and then turn on the supply power to the TouchPAD device (reset). Finally, you can see that the TouchPAD USB driver is in the list of the device manager. (something like "Stellaris Device Firmware Upgrade")



Downloading programs through USB

Follow the flow to download a program to the TouchPAD device.

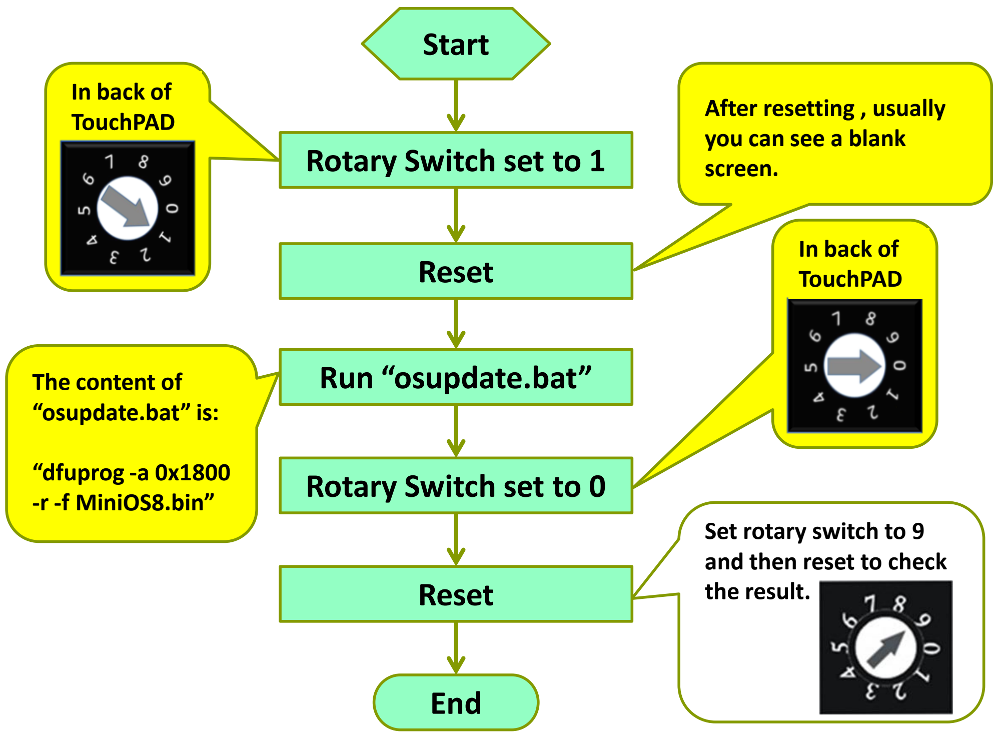


Updating OS through USB

Except the TPD-280 and the TPD-283 devices, all other devices in the TouchPAD series have an OS (Operating System) on them. In cases that users may need to update OS, we introduce the flow to do that.

You can find that an OS image file is in the following directory: [HMIWorks_Install_Path]\bin\boot\[Device_Name]\MiniOS8.bin. For example, an OS image file, MiniOS8.bin can be found at "C:\ICPDAS\HMIWorks_Standard\bin\boot\TPD-280U\" if trying to find out TPD-280U's OS image file. And in the same directory, there's a batch file

named “osupdate.bat” and it is used to update OS.
Follow the flow to update OS to the TouchPAD devices.

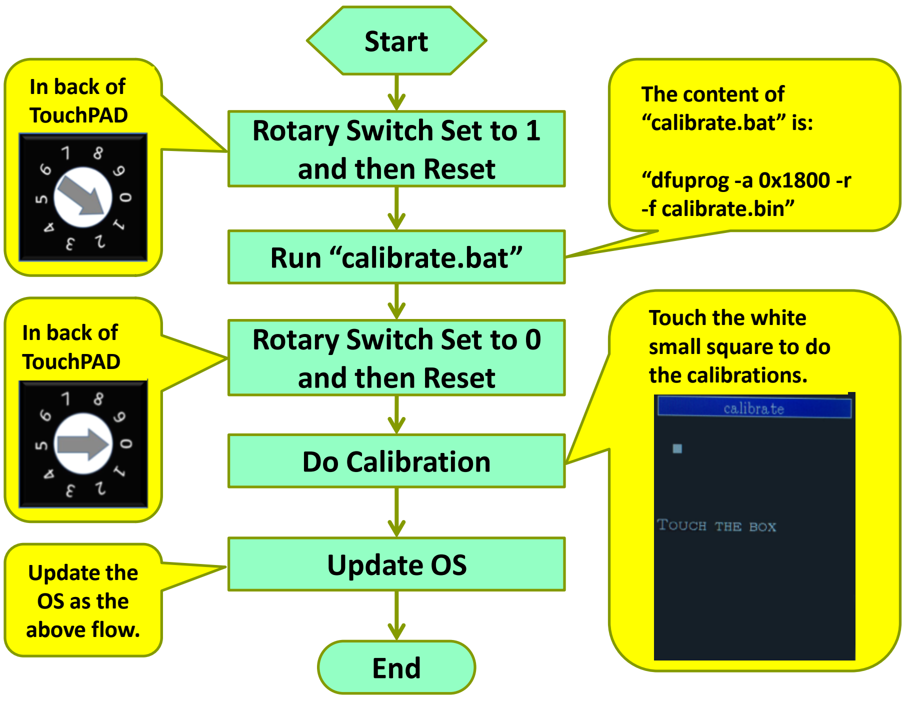

Start
Rotary Switch set to 1
Reset
Run “osupdate.bat”
Rotary Switch set to 0
Reset
End
In back of TouchPAD
After resetting , usually you can see a blank screen.
In back of TouchPAD
The content of “osupdate.bat” is:
“dfuprog -a 0x1800 -r -f MiniOS8.bin”
Set rotary switch to 9 and then reset to check the result.

Calibrations

Usually users need not to calibrate the touch screen because we calibrate the TouchPAD devices before shipping. However, in cases users may need to calibrate the touch screens, we introduce the flow below.

You can find that the calibration programs are in the following directory: “[HMIWorks_Install_Path]\bin\boot\[Device_Name]\calibrate”. For example, there are two calibration programs can be found at “C:\ICPDAS\HMIWorks_Standard\bin\boot\TPD-280U\calibrate” if trying to calibrate TPD-280U. One is for landscape (when the screen is horizontal) and the other is for portrait (when the screen is upright). And in the same directory of the file, calibrate.bin, there’s a batch file which is used to download the calibrate.bin to the TPD-280U device and it is called “calibrate.bat”.

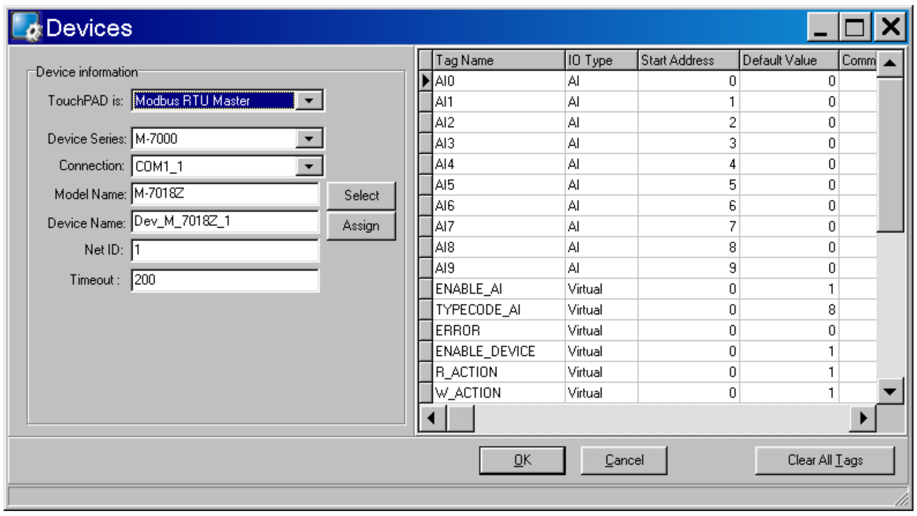
Follow the flow to calibrate the TouchPAD device.


Start
Rotary Switch Set to 1 and then Reset
Run "calibrate.bat"
Rotary Switch Set to 0 and then Reset
Do Calibration
Update OS
End
In back of TouchPAD
In back of TouchPAD
Update the OS as the above flow.
The content of "calibrate.bat" is: "dfuprog -a 0x1800 -r -f calibrate.bin"
Touch the white small square to do the calibrations.
calibrate
TOUCH THE BOX

4.3. Connecting to I/O Devices

We provide connection methods for three series of I/O modules, the PET-7000, the I-7000, and the M-7000 series and a general approaches for the Modbus TCP Master I/O modules, Modbus RTU Master/Slave I/O modules.

Click the "**Register Devices (I/O)**" option from the "**HMI**" menu or press the "**F3**" on your keyboard and then the "**Devices**" window is displayed.



TouchPAD is:	Modbus RTU Master
Device Series:	M-7000
Connection:	COM1_1
Model Name:	M-7018Z
Device Name:	Dev_M_7018Z_1
Net ID:	1
Timeout :	200

Tag Name	IO Type	Start Address	Default Value	Comm
AI0	AI	0	0	
AI1	AI	1	0	
AI2	AI	2	0	
AI3	AI	3	0	
AI4	AI	4	0	
AI5	AI	5	0	
AI6	AI	6	0	
AI7	AI	7	0	
AI8	AI	8	0	
AI9	AI	9	0	
ENABLE_AI	Virtual	0	1	
TYPECODE_AI	Virtual	0	8	
ERROR	Virtual	0	0	
ENABLE_DEVICE	Virtual	0	1	
R_ACTION	Virtual	0	1	
W_ACTION	Virtual	0	1	

Step by step specify or fill each field and click the **OK** button to import tags. Finally, check these imported tags in the **Workspace**.

The possible device series are as below:

TouchPAD is	**Device Series**	**Device Series Description**
Modbus RTU Master	M-7000	Remote I/O modules over Modbus RTU protocol
	User_Define (MRTUM)	Remote Modbus RTU I/O modules of third parties
Modbus RTU Slave	Profiles (MRTUS)	TouchPAD is treated as a slave device and wait for some master devices to control
DCON Master	I-7000	Remote I/O modules over DCON protocol
Modbus TCP Master	PET-7000	Remote I/O modules over Modbus TCP protocol
	WISE-7000	WISE (Web Inside, Smart Engine) devices
	User_Define (MTCPM)	Remote Modbus TCP I/O modules of third parties

The explanations of items in the **Devices** window (Register Device):

Item	**Description**
Connection	Specify an existing connection approach (TCPIP or UART) or create a new one to connect to the I/O module.
Device Name	Specify the name of the I/O module. Users can assign a name they want.
Model Name	Specify the model name of the I/O module to connect.
Net ID	The specified ID of the I/O module in the network. Possible range: For Modbus RTU: 1 ~ 247 For DCON: 0 ~ 255 For PET-7000: 1 ~ 255
Timeout	The timeout value for the communications, both RS-485 and TCP

5. Development Software, HMIWorks

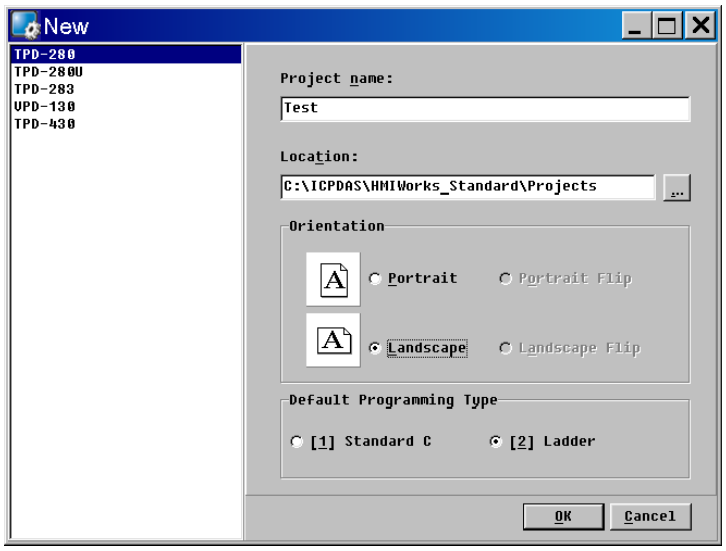
HMIWorks is the development tool for, both TPD and VPD series. It supports two programming types, Standard C and Ladder. Compared with traditional GUI development tools, HMIWorks is easy to learn, flexible to design GUIs, and takes less time to raise productivity.

Features of HMIWorks include:

- FREE of charge (for ICP DAS TouchPAD devices)
- Two programming types, ladder diagram and Standard C
- Plenty of widgets
- Plenty of demos shorten development time
- Advanced search for I/O modules
- Detail error messages
- Easy downloading after building
- Automatic generated codes for user-designed frames
- Multi-frame design
- WYGIWYS (What You Get Is What You See)
- Abstract graphics as simple APIs
- Easy learning IDE to raise productivity in short time

5.1. The Construction of HMIWorks

Before showing the construction of HMIWorks, create a new project first. Click **File** menu, then click on **New….**


New

TPD-280
TPD-280U
TPD-283
VPD-130
TPD-430

Project name: Test

Location: C:\ICPDAS\HMIWorks_Standard\Projects

Orientation

( ) Portrait ( ) Portrait Flip

(●) Landscape ( ) Landscape Flip

Default Programming Type

( ) [1] Standard C (●) [2] Ladder

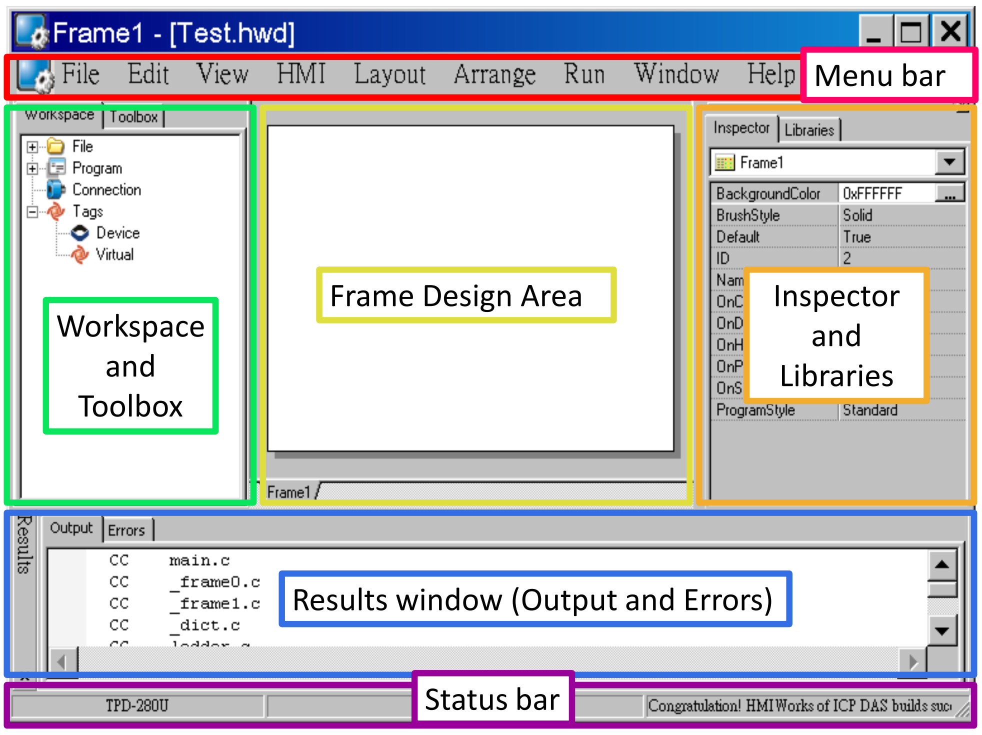
OK Cancel

A *valid project name* is a sequence of one or more letters, digits or underscore characters (_). It must not begin with a digit. Besides, it is of suggested length 100 characters (including its path).

Choose the target module, **Orientation**, and the **Default Programming Type**. Press **OK** and HMIWorks integrated design environment shows as below.

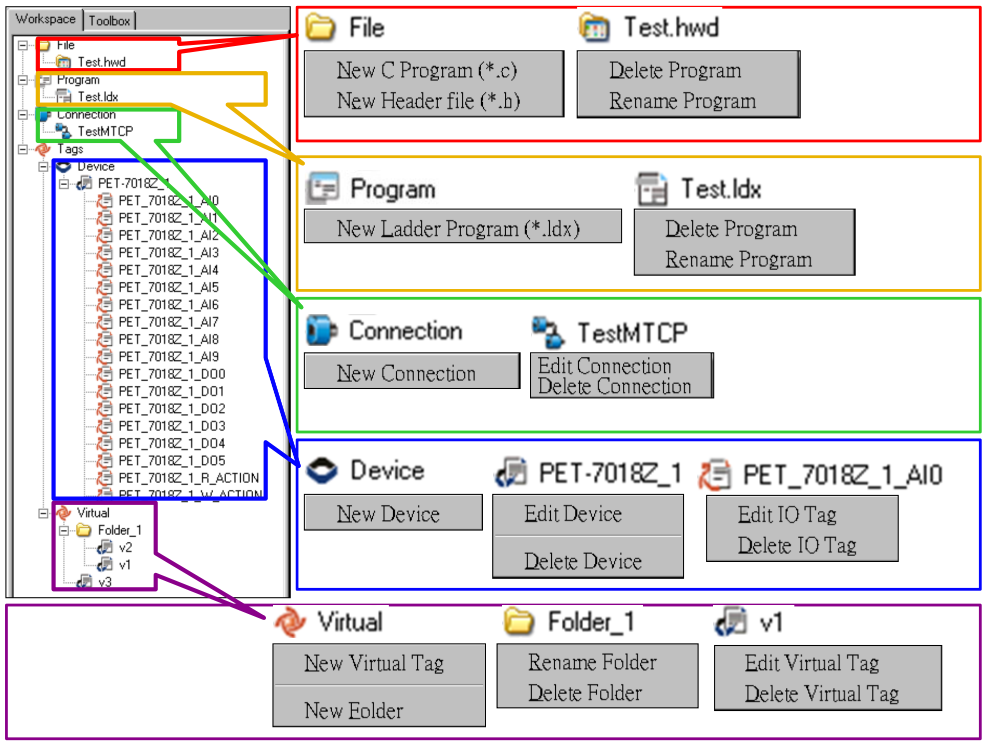
There are several parts of HMIWorks.

1. Menu bar
2. Workspace and Toolbox
3. Frame Design area
4. Inspector and Libraries
5. Results window (Output and Errors)
6. Status bar



```
CC      main.c
CC      _frame0.c
CC      _frame1.c
CC      _dict.c
```

Below are the operations (pop-up menus) that users have in **Workspace**.



Next sections show the functions of these parts.

5.2. The Options of TouchPAD

Users can set the options of the TouchPAD in the file, hmi_options.h.
The file is located in “C:\ICPDAS\HMIWorks_Standard\include” directory, where “C:\ICPDAS\HMIWorks_Standard\” is the installation directory.

The defines in the hmi_options.h are the options for TouchPAD. They are listed below:

Define	Default	Descriptions
HMI_STARTUP_DELAY	0	This is used to delay the system for a while before enabling the LCD backlight. (unit=ms)
HMI_WDT_ENABLE	0	Normally, the system will automatically refresh the watchdog timer. And the system should be rebooted only when a procedure is blocking the system for a period larger than the HMI_WDT_TIMEOUT value.
HMI_WDT_TIMEOUT	2000	The timeout value to reboot (Valid range: 1,000 ~ 50,000 ms)
HMI_WDT_CLEAR	500	The refreshing period to prevent reboot. The system refreshes (clears) the watchdog timer to prevent rebooting.
HMI_STARTUP_BEEP	1	When startup, 1 = Beep, 0 = disable
HMI_TOUCH_BEEP	1	When touched, 1 = Beep, 0 = disable
HMI_BEEP_FREQ	800	For TPD-430/ TPD-430-EU only. This is the pitch value of the beep. The valid range is 30 ~ 4,000 Hz.
HMI_BEEP_MS	25	For TPD-430/ TPD-430-EU only. The time length for each beep
HMI_LCD_BRIGHTNESS	255	For TPD-430/ TPD-430-EU only. 0=the darkest, ..., 255=the brightest.
HMI_STARTUP_LED	0	1=Enable red LED indicator, 0 = Disable red LED indicator. This

		option is used for TPD-430 and VPD-130 only.
HMI_LCD_AUTO_OFF	30	How long does it take to turn the LCD off automatically when the touch is idle. The LCD will back again when touched is pressed and released. 0 = disable, 5 ~ 300 seconds
HMI_LCD_ON_BEEP	1	0 = disable, 1 = Beep when LCD backlight is turned on
HMI_LCD_OFF_BEEP	1	0 = disable, 1 = Beep when LCD backlight is turned off
HMI_TCP_TIMEOUT_BEEP	0	0 = Disable, 1 = Beep when TCP timeout/error

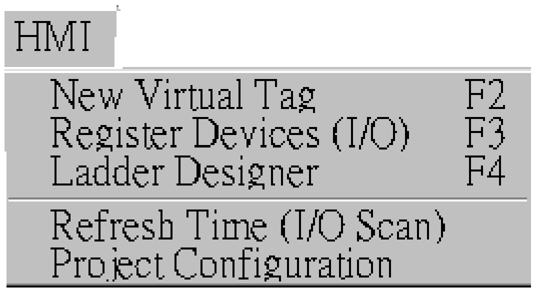
Note:
The options in the hmi_options.h are treated as global settings that affect all projects. To affect only one project, copy this hmi_options.h file into the project directory and then modify it.

5.3. Ladder Designer

One of the most important features of HMIWorks is Ladder Designer.
The ladder logic is defined by the followings:

1. A Ladder Diagram consists of many rungs.
2. Each rung resembles a circuit which is formed by relays.
3. All of the rungs are executed serially in a loop.

Click **HMI** menu to use this feature.



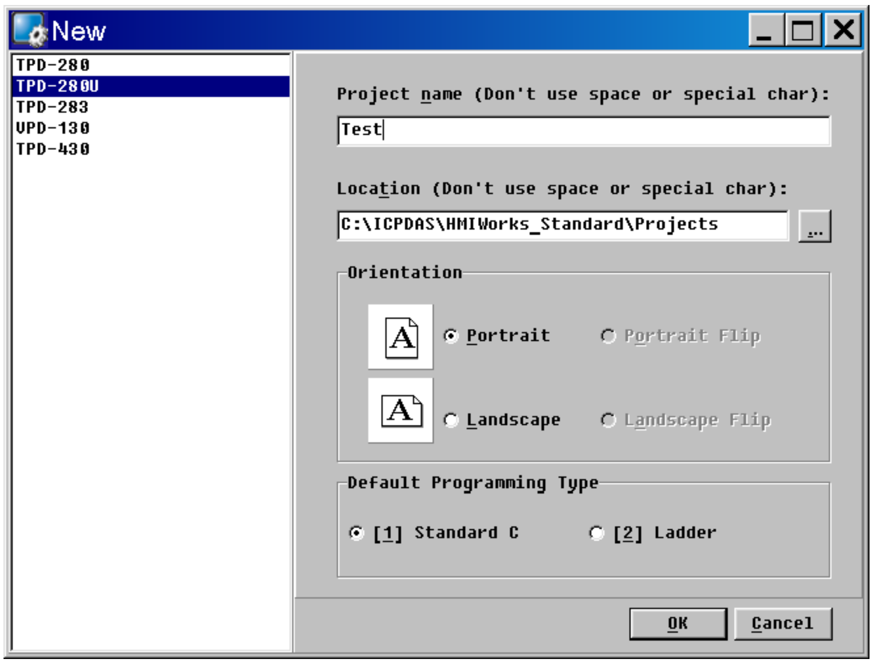
- **New Virtual Tag**: defines your own variables
- **Register Devices (I/O)**: uses I/O devices of ICP DAS on the networks
- **Ladder Designer**: designs your ladder logics
- **Refresh Time (I/O Scan)**: set the refresh time of each scan of a Ladder (the minimum value is 100 ms) → depreciated, this item is moved to the "Project Configuration".
- **Project Configuration**: the configuration of the project

Users can manage their ladder design in the **Workspace**.

5.3.1. Getting Started

- To use the **Ladder Designer**, run HMIWorks_Standard.exe first.

- Then create a new project.



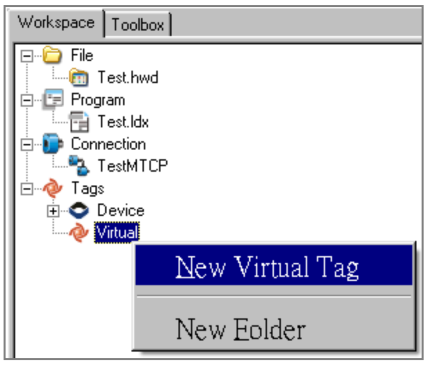
Project name (Don't use space or special char):
Test

Location (Don't use space or special char):
C:\ICPDAS\HMIWorks_Standard\Projects

Orientation
[✓ Portrait] Portrait Flip
Landscape Landscape Flip

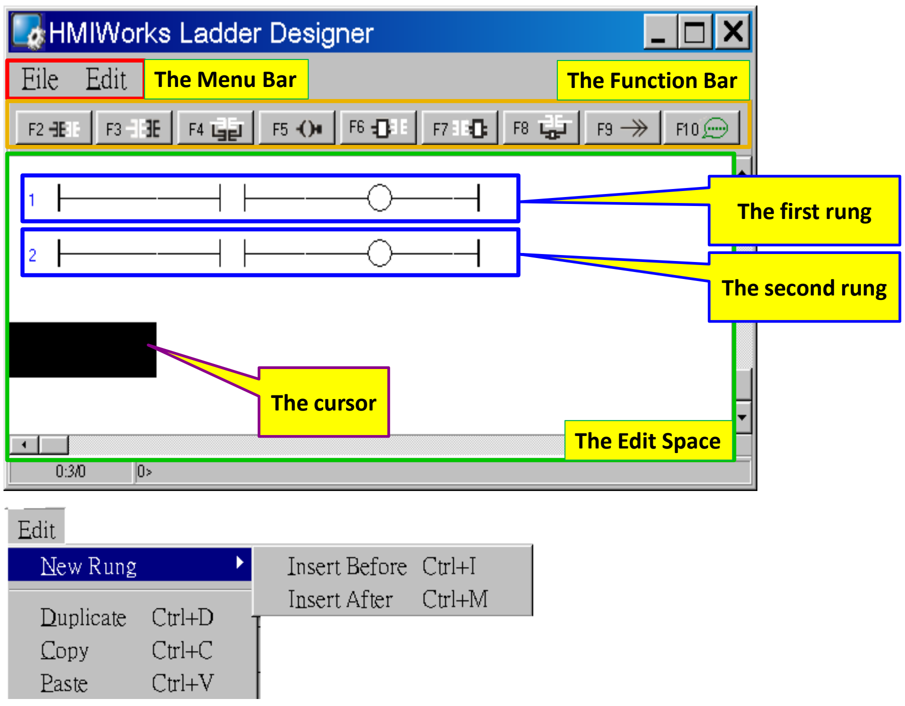
Default Programming Type
[✓ [1] Standard C] [2] Ladder

- **New Virtual Tag** and open **Ladder Designer** from the **HMI** menu
- **New Virtual Tag** adds variables used in the **Ladder Designer**.
  There are three ways to open the "**Edit variable**" window,
  - pressing **F2** key on your keyboard,
  - select the **New Virtual Tag** option in the **HMI** menu,
  - right-click on the **Virtual** item and click the "**New Virtual Tag**" option.



5.3.2. Introduction to Ladder Designer

A **Ladder Designer** is a tool to implement the ladder logic according to users' design.
Press **F4** on your keyboard to open the **Ladder Designer**.



Mainly, a **Ladder Designer** consists of three parts, the menu bar, the function bar, and the edit space. The highlighted rectangle area is the cursor.

The briefings of the function bar:

Item	Description

F2	Insert a contact input in the left of the cursor
F3	Insert a contact input in the right of the cursor
F4	Insert a contact input which is parallel to the cursor
F5	Insert a coil output
F6	Insert a function block in the left of the cursor
F7	Insert a function block in the right of the cursor
F8	Insert a function block which is parallel to the cursor
F9	Insert a Jump which is parallel to the cursor
Space [T]	~~Change the type of the contact input/ coil output~~
F10	Add comments

The briefings of the contact input type:

Item	Description
┤ ├	A normally-open contact input
┤\\├	A normally-closed contact input
┤P├	A positive transition contact input ➢ when the state from OFF to ON, trigger one shot
┤N├	A negative transition contact input ➢ when the state from ON to OFF, trigger one shot

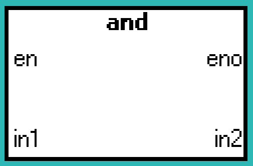
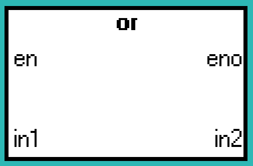
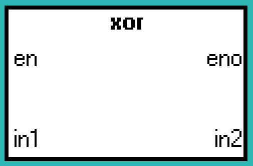
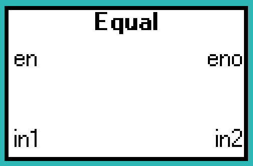
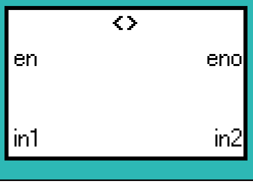
The briefings of the coil output type:

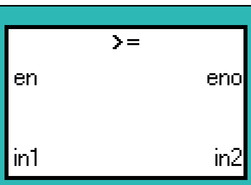
Item	Description
─○─	A normally-open coil output

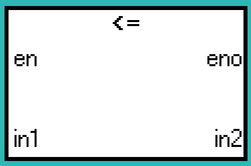
-(/)-	A normally-closed coil output
-(S)-	A “Set” coil output ➢ once triggered, the coil remains ON until a reset
-(R)-	A “Reset” coil output ➢ once triggered, the coil remains OFF until a set
-(P)-	A positive transition coil output ➢ when the state from OFF to ON, trigger one shot
-(N)-	A negative transition coil output ➢ when the state from ON to OFF, trigger one shot

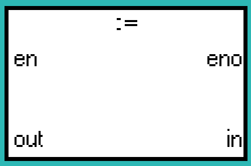
The briefings of function blocks

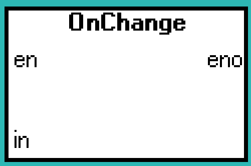
Refer to “C:\ICPDAS\HMIWorks_Standard\bin\FunctionBlock” for more details.

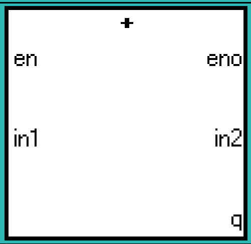
Item	Description (parts of C code)	Group
	**AND (And)** If en == 1, eno = in1 & in2; Else eno = 0.	default
	**OR (Or)** If en == 1, eno = in1 | in2; Else eno = 0.	default
	**XOR (Exclusive Or)** If en == 1, eno = in1 ^ in2; Else eno = 0.	default
	**Equal** If (en == 1 and in1 is equal to in2), eno = 1; Else eno = 0;	default
	**NE (Not Equal)** If (en == 1 and in1 is not equal to in2), eno = 1; Else eno = 0;	default

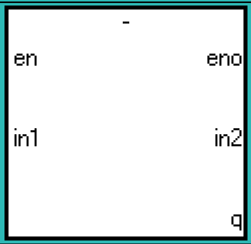
	**GE (Greater or Equal)**
	If (en == 1 and in1 >= in2),
	eno = 1;
	Else eno = 0;
		default

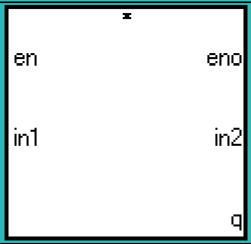
	**LE (Less or Equal)**
	If (en == 1 and in1 <= in2),
	eno = 1;
	Else eno = 0;
		default

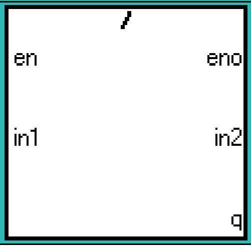
	**Assign**
	If en == 1, "out" is assigned with "in" and eno = 1;
	Else eno = 0;
		default

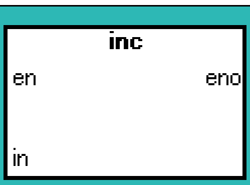
	**OnChange**
	If en == 1 and "in" is changed, eno = in;
	Else eno = 0;
		default

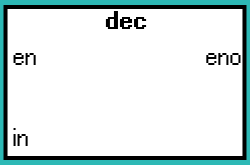
	**Add (Addition)**
	If en == 1,
	q = in1 + in2 and eno = 1;
	Else eno = 0;
		math

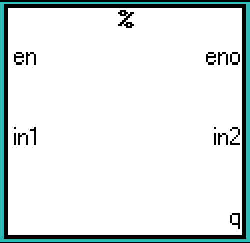
	**Sub (Subtraction)**
	If en == 1,
	q = in1 - in2 and eno = 1;
	Else eno = 0;
		math

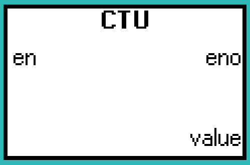
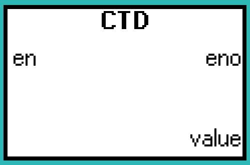
	**Mul (Multiplication)**
	If en == 1,
	q = in1 * in2 and eno = 1;
	Else eno = 0;
		math

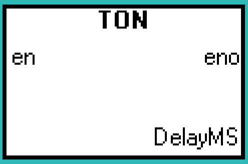
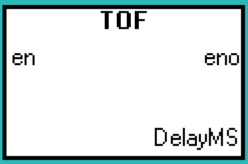
	**Div (Division)**
	If en == 1,
	q = in1 / in2 and eno = 1;
	Else eno = 0;
		math

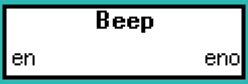
	**Inc (Increment)**
	If en == 1, increment "in" by 1;
	Else eno = 0;
		math

	**Dec (decrement)**
	If en == 1, decrement "in" by 1;
	Else eno = 0;
		math

	**Mod (Modulo)**
	If en == 1,
	q = in1 % in2 and eno = 1;
	Else eno = 0;
		math

	**CTU (Count Up)** End: count >= value. If en == 1, Count up until End, During counting, eno = 0, When End, eno = 1; Else Reset count to 0, eno = 0; Note: the counting period depends on the number of rungs	counter
	**CTD (Count Down)** End: Count <= 0. If en == 1, Count down until End, During counting, eno = 0, When End, eno = 1; Else Reset count to value, eno = 0; Note: the counting period depends on the number of rungs	counter

	**TON (Timer On, unit=ms)** End: elapsed >= DelayMS. If en == 1, Start the timer if not, Stop the timer when End, When timer runs, eno = 0, When End, eno = 1; Else Reset the timer, eno = 0;	timer
	**TOF (Timer Off, unit=ms)** End: elapsed >= DelayMS. If en == 1, Start the timer if not, Stop the timer when End, When timer runs, eno = 1, When End, eno = 0; Else Reset the timer, eno = 0;	timer

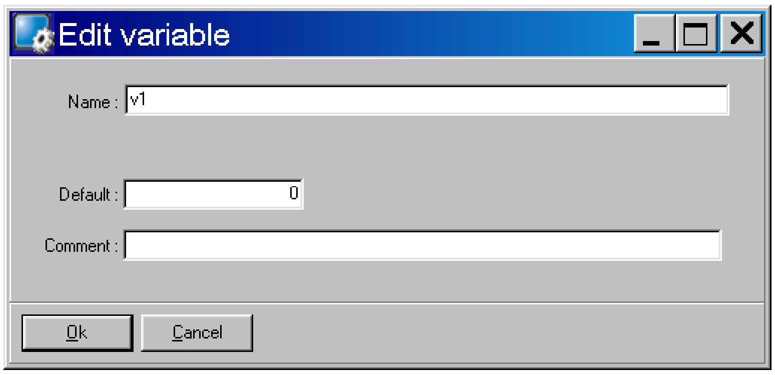
	**Beep**
	If en == 1, beep and eno = 1;
	Else eno = 0;
		system

5.3.3. Operations of Ladder Designer

5.3.3.1. New Virtual Tags (F2)

To use the **Ladder Designer**, add variables for the **Ladder Designer** first.

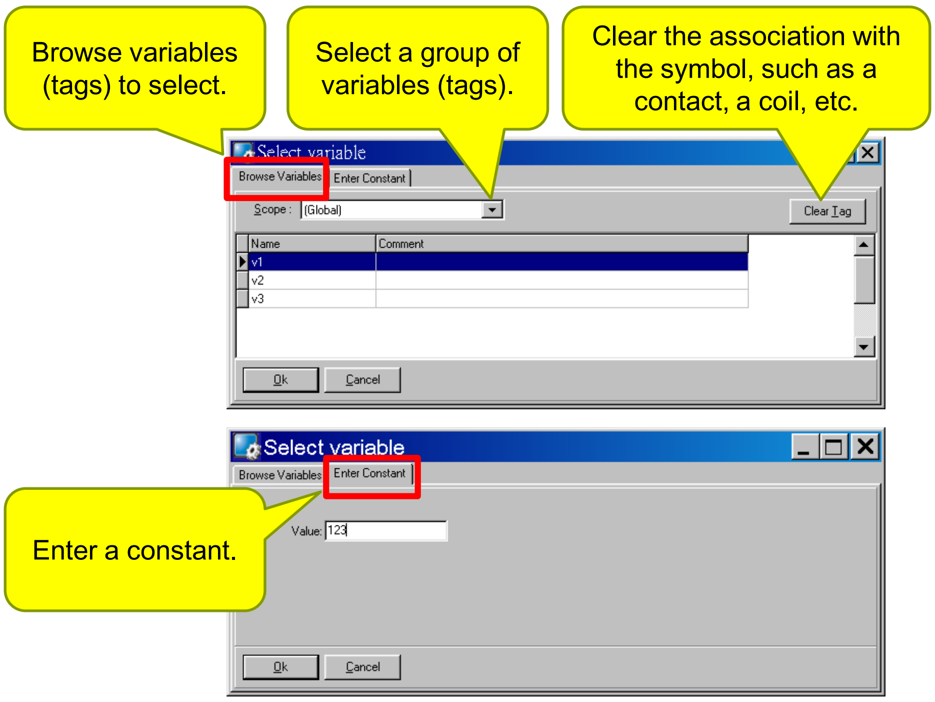
1. Press **F2** on your keyboard or click the "**New Virtual Tag**" option from the "**HMI**" menu to add virtual tags, then an "**Edit variable**" window displayed.
2. Define a new variable in the "Name" field and optionally fill the other fields.
3. Finally, press the **OK** button to take effect.



Here, we add three variable v1, v2 and v3 for example in the next sections.

5.3.3.2. Assigning Variables and Constants

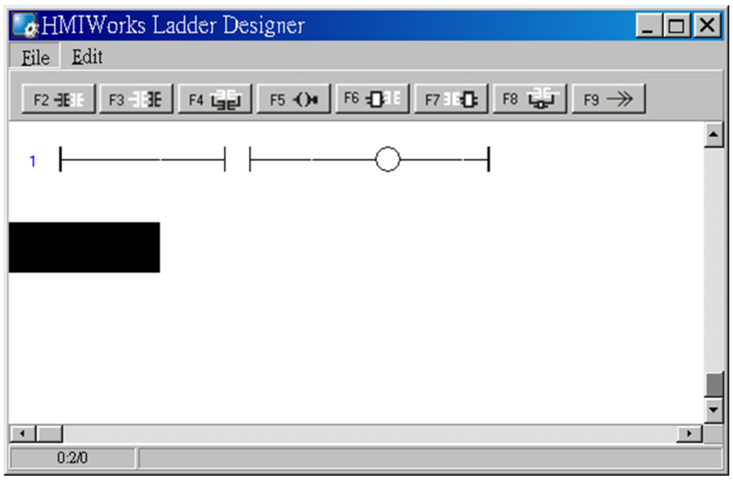
Double click on the symbol of contact inputs, coil outputs, etc. to open the "**Select variable**" window to select variables or enter constants as below.



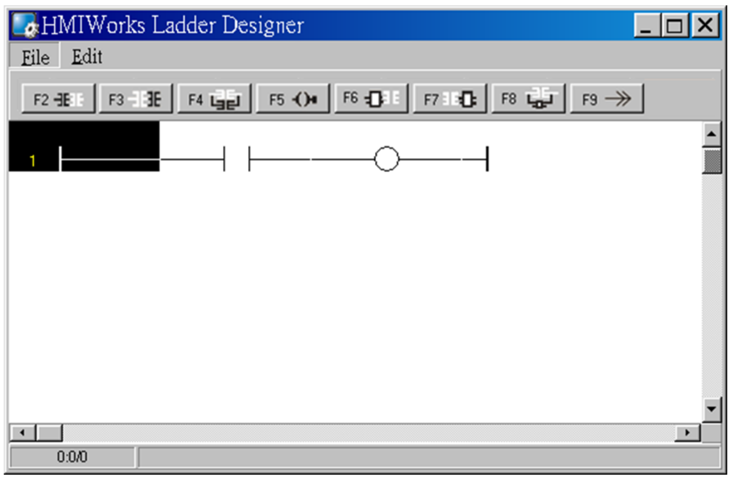
5.3.3.3. Inserting and Deleting a Rung

To insert a rung, move the cursor (the highlighted area) to the empty place and then press **F2** (or **F3**/**F4**) on your keyboard.

(Or press **F6**, **F7**, **F8** to insert a rung with a function block.)

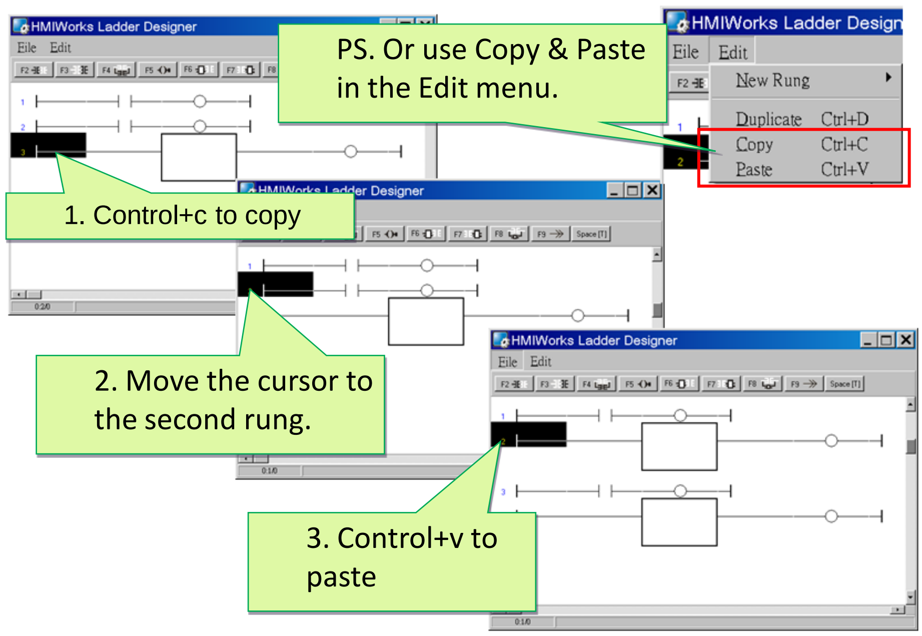


To delete a rung, move the cursor to the starting point of the rung and then press "**Delete**" key.



5.3.3.4. Copying and Pasting a Rung

Supposed that we have three rungs and we want to copy the third rung and insert it between the first and the second rungs.

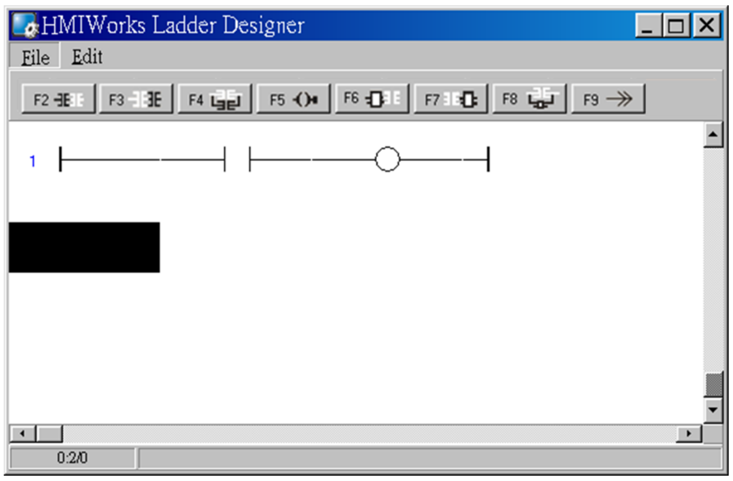


5.3.3.5. Inserting and Deleting a Contact Input

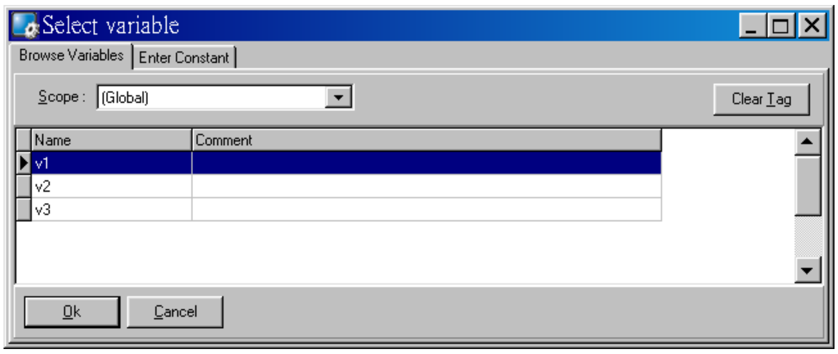
To demonstrate how to insert or delete a contact input and other related issues, go through the steps below.

1. Associate a variable to a contact input

Press **F2** on your keyboard to insert a new rung with a contact input and a coil output.

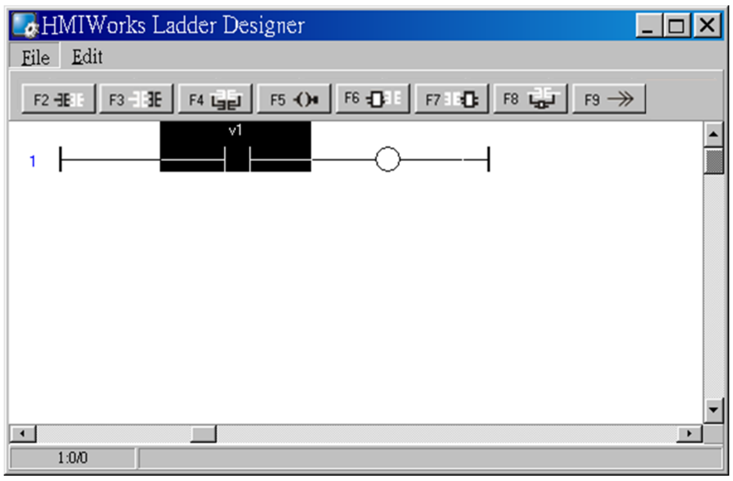


In the new rung, double-click on the contact input to open the "**Select variable**" window to select a variable (tag) and assign it to the contact input.



Name	Comment
v1	
v2	
v3	

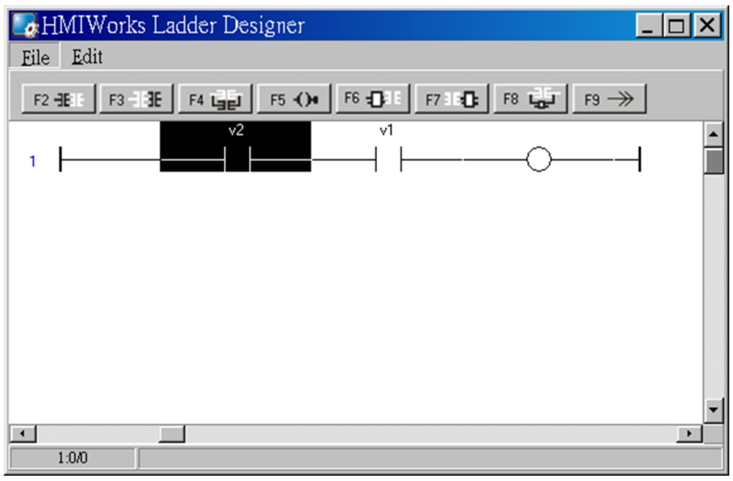
For example, we double-click on the variable "v1" and set to the contact input. v1, v2 and v3 are the variables set by "**New Virtual Tags**". Refer to the "**New Virtual Tags**" section.



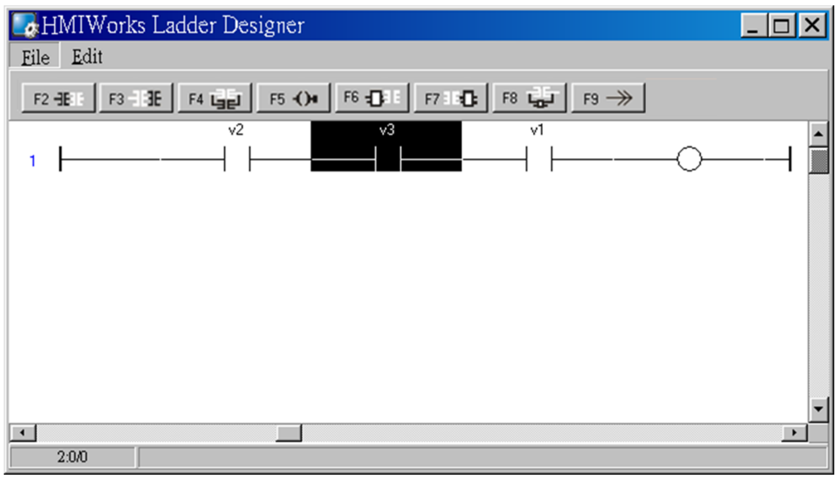
2. Insert a new contact input in the left of the cursor (**F2**)

Move the cursor to the "v1" contact input and then press **F2**.

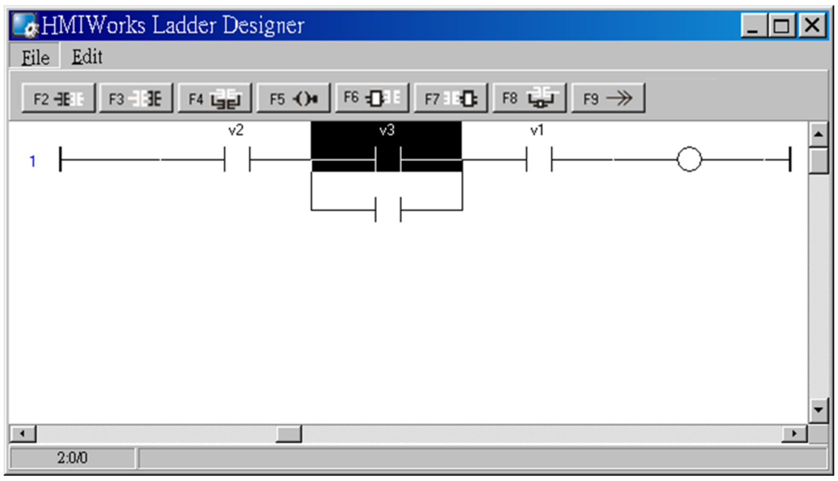
And to make things clear, associate variable "v2" to the newly-inserted contact input.



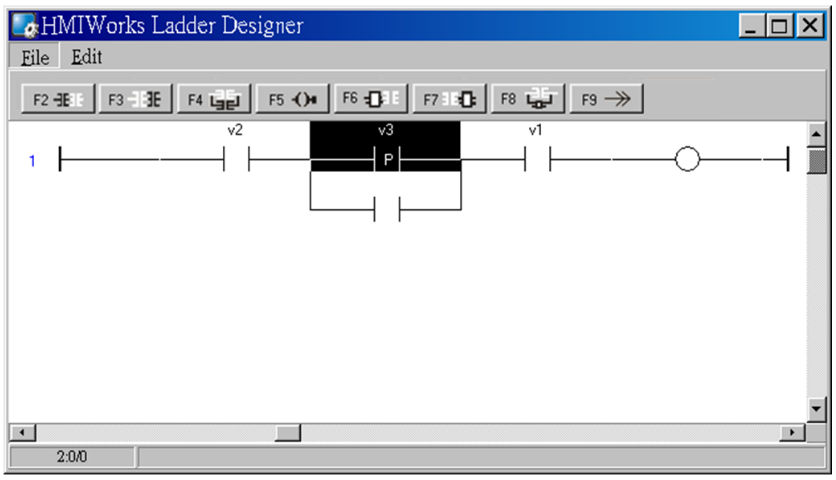
3. Insert a new contact input in the right of the cursor (**F3**)
Move the cursor to the “v2” contact input and then press **F3**.
Associate variable “v3” to the newly-inserted contact input.



4. Insert a new contact input which is parallel to the cursor (**F4**)
Move the cursor to the “v3” contact input and then press **F4**.



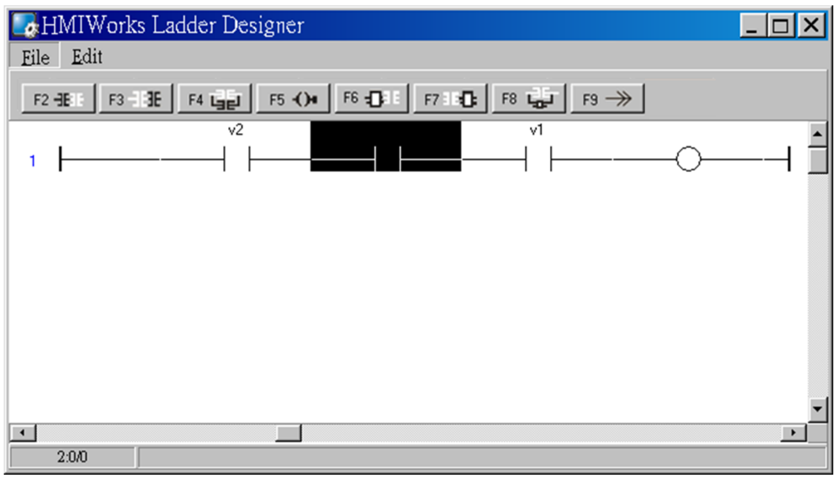
5. Set the type of a contact input
Move the cursor to a contact input and then press the space bar to change the type of the contact input.
For example, we move the cursor to the “v3” contact input. Press the spacebar twice to set the type of the contact input to pulse contact input.



6. Delete a contact input in the rung

Move the cursor to the contact input you want to delete. Then press "**delete**" on your keyboard.

For example, we move the cursor to the "v3" contact input and then press the "**delete**" key.

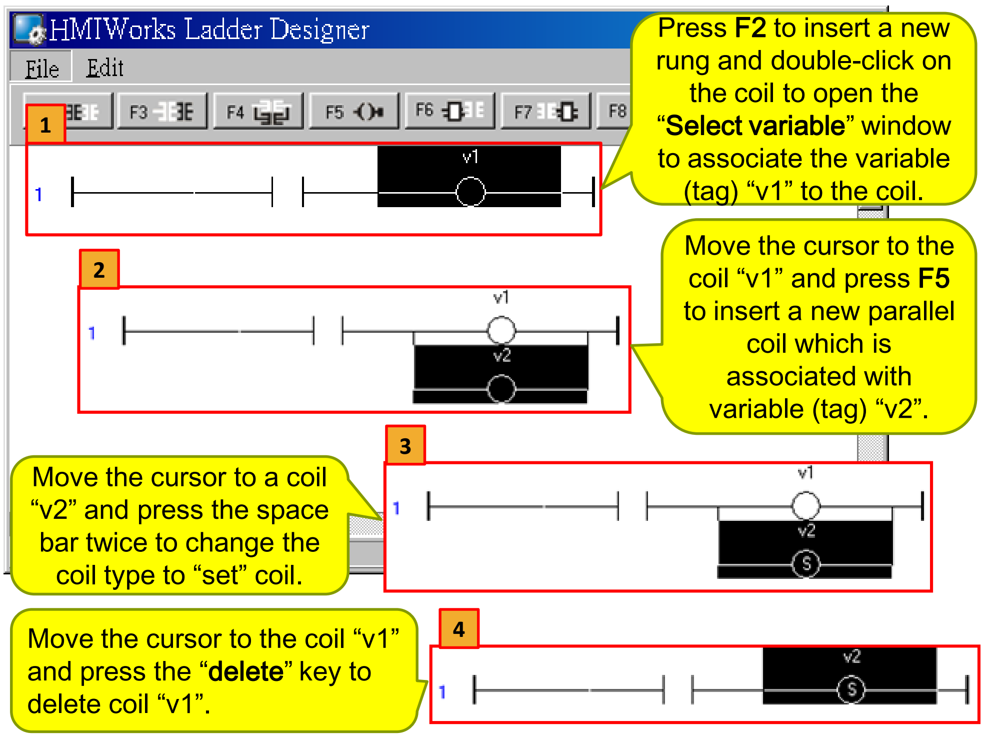


7. Delete the rung.

Move the cursor to the starting point of the rung and then press "**Delete**" on your keyboard.

5.3.3.6. Inserting and Deleting a Coil Output

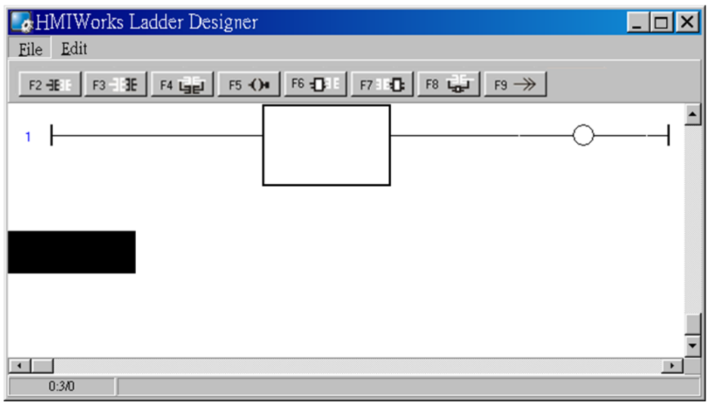
To demonstrate how to insert or delete a coil output and other related issues, see the figure below.


HMIWorks Ladder Designer
File Edit
F3 F4 F5 F6 F7 F8
1
v1
Press F2 to insert a new rung and double-click on the coil to open the "Select variable" window to associate the variable (tag) "v1" to the coil.
2
v1
v2
Move the cursor to the coil "v1" and press F5 to insert a new parallel coil which is associated with variable (tag) "v2".
Move the cursor to a coil "v2" and press the space bar twice to change the coil type to "set" coil.
3
v1
v2
S
Move the cursor to the coil "v1" and press the "delete" key to delete coil "v1".
4
v2
S

5.3.3.7. Inserting and Deleting a Function Block

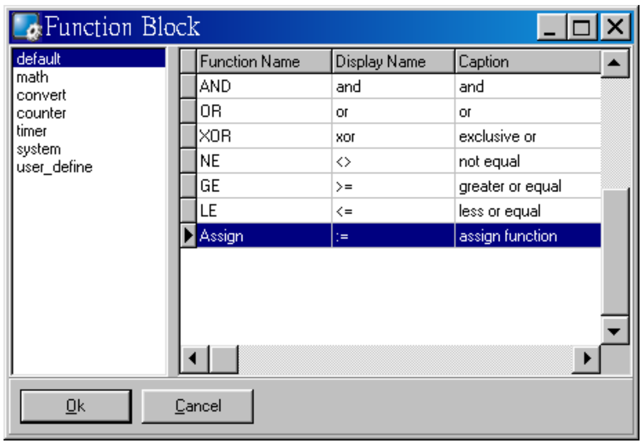
To demonstrate how to insert or delete a function block and other related issues, go through the following steps.

1. Set the function type to a function block
   i. Insert a new rung
      Press **F6** to insert a new rung with a function block and a coil output.



   ii. Choose function type
      In the new rung, double-click on the function block to open the

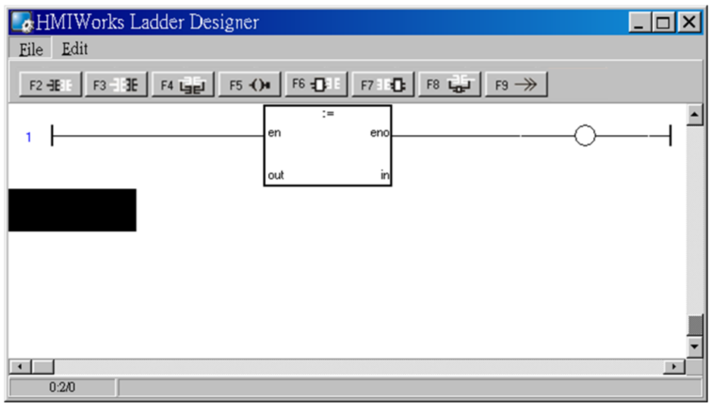
"**Function Block**" window.



Function Name	Display Name	Caption
AND	and	and
OR	or	or
XOR	xor	exclusive or
NE	<>	not equal
GE	>=	greater or equal
LE	<=	less or equal
Assign	:=	assign function

Double-click on the "Function Name" field in the list to set the type of the function.

For example, we double-click on the Function "Assign" in the default group and set to the function block.



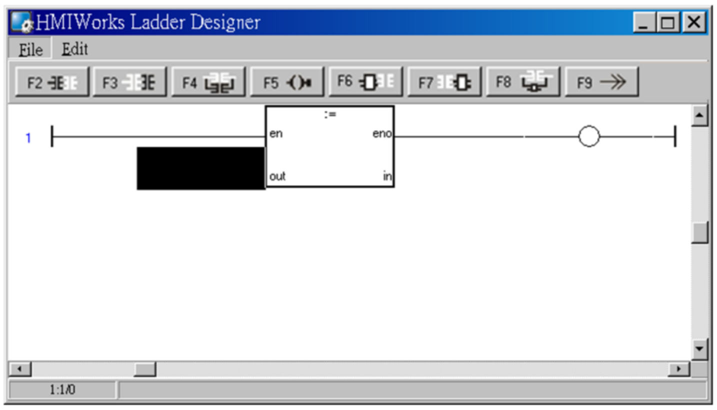
iii. Assign the variables to the function

Now, we should assign the variable to the function "Assign". As you can see, there are four variables, en, eno, out, in.

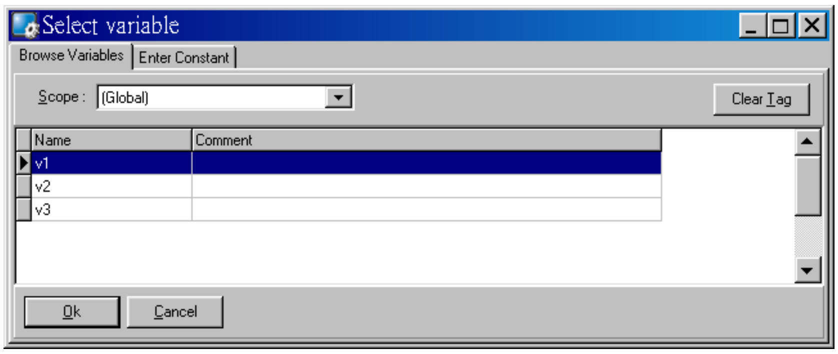
- Both "en" and "eno" cannot associate variables by users.
- We can associate "out" and "in" with the variables we define by "**New Virtual Tags**".

For example, we associate "v1" to "out" and "v2" to "in". v1, v2 and v3 are the variables defined in from the "**Edit Variable**" dialog box. Refer to the "**New Virtual Tags**" section.

To associate "v1" to "out", move the cursor just beside "out" but not in the function block.

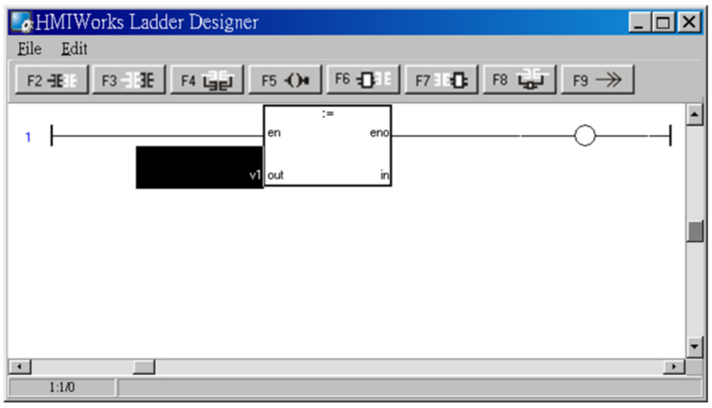


Double-click on **just beside "out"** to open "**Select variable**" window.

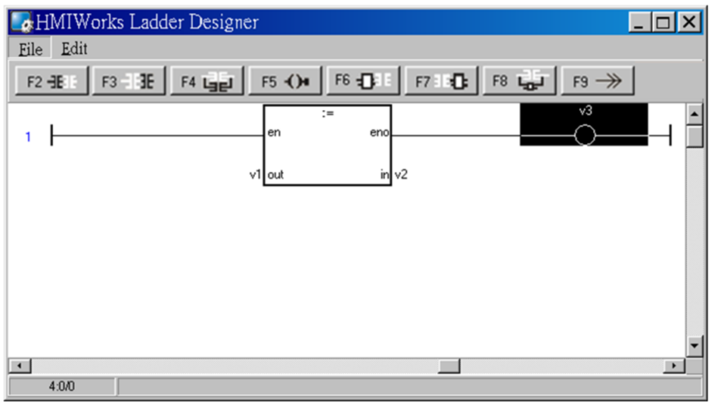


Name	Comment
v1	
v2	
v3	

Double-click on the variable in the list to assign the variable to "out". For example, we double-click on the variable "v1" and set to "out" of "Assign" function.



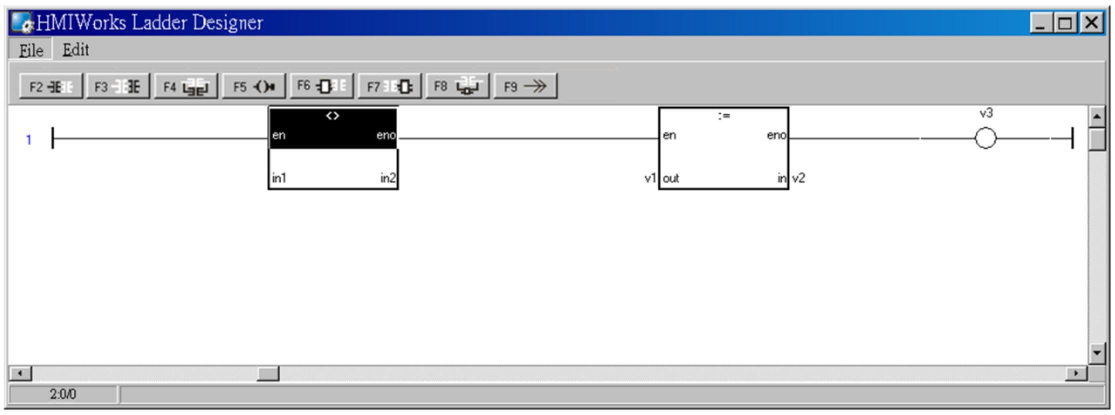
Set "v2" to "in" of "Assign" function in the same way.
Finally, set "v3" to the coil output.



This function assigns "v2" to "v1" if en is set to high.
The coil output "v3" is purely defined by eno, where eno = en.

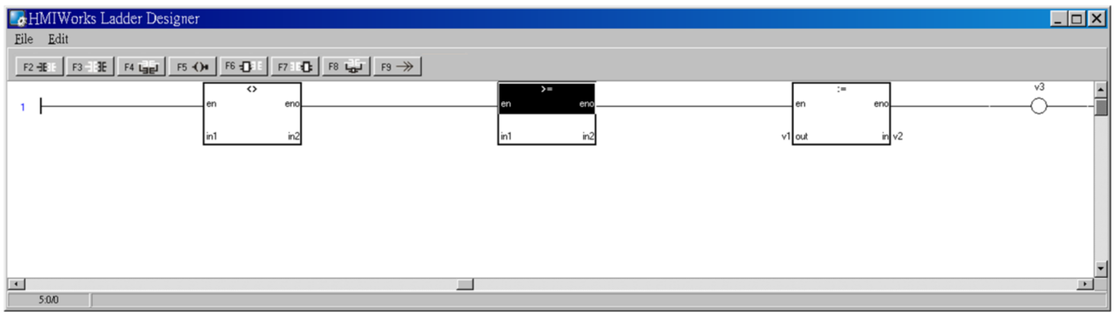
2. Insert a new function block in the left of the cursor (**F6**)

Move the cursor to the "Assign" function block and then press **F6**.
And to make things clear, set the newly-inserted function block as "NE" (not equal).

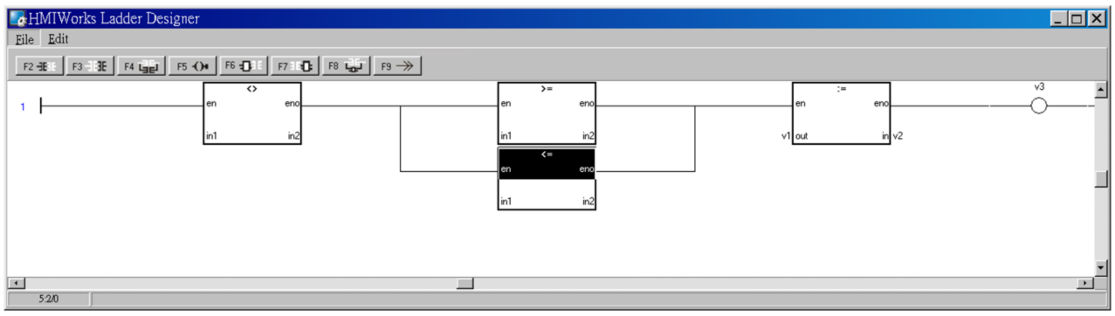


3. Insert a new function block in the right of the cursor (**F7**)

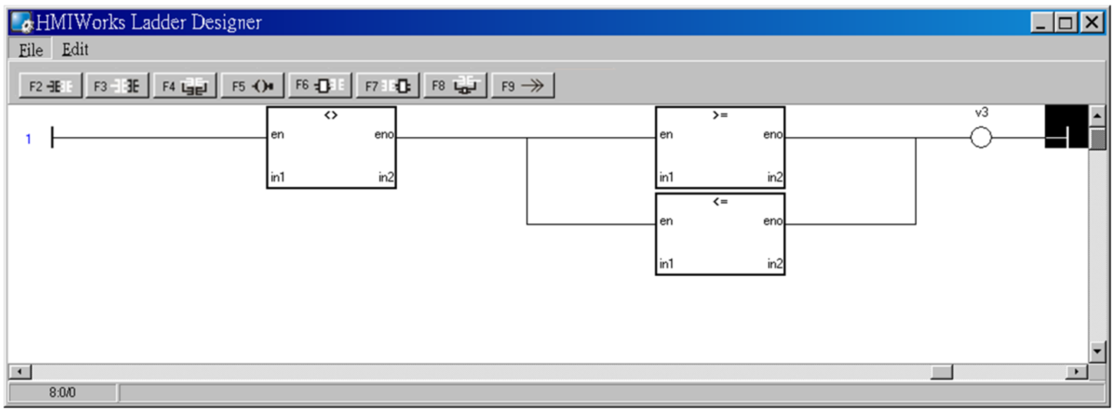
Move the cursor to the "NE" function block and then press **F7**.
Set the newly-inserted function block as "GE" (greater than or equal).



4. Insert a new function block which is parallel to the cursor (**F8**)
Move the cursor to the "GE" function block and then press **F8**.
Set the newly-inserted function block as "LE" (less than or equal).



5. Delete a function block in the rung
Move the cursor to the function block you want to delete. Then press "**delete**" on your keyboard.
For example, we move the cursor to the "Assign" function block and then press the "**delete**" key.

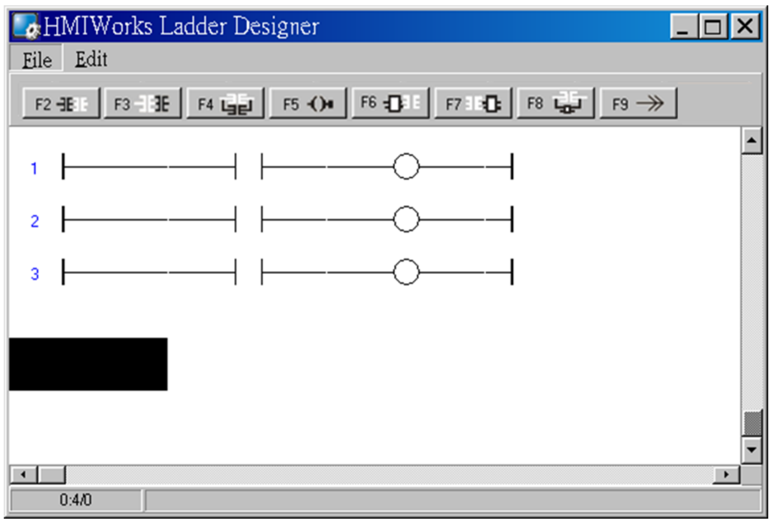


6. Delete the rung.
Move the cursor to the starting point of the rung and then press "**Delete**" on your keyboard.

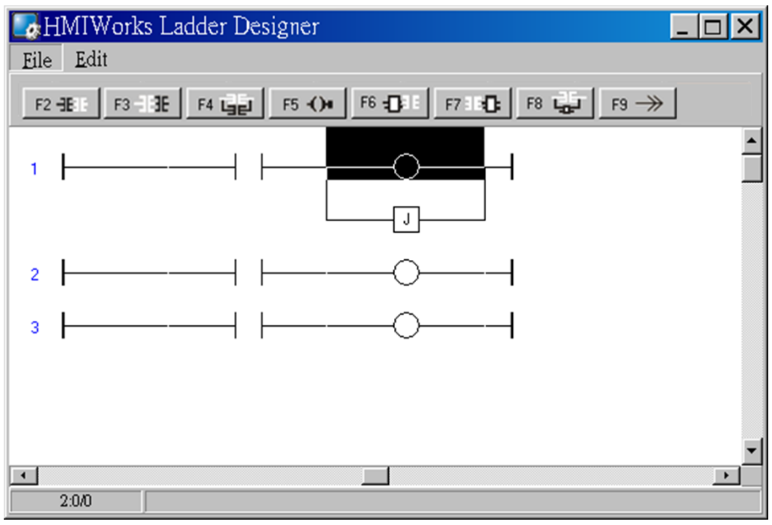
5.3.3.8. Jump to a Label

To demonstrate how to jump to a label, first we create three rungs and then explain how to skip the second rung and jump to the third.

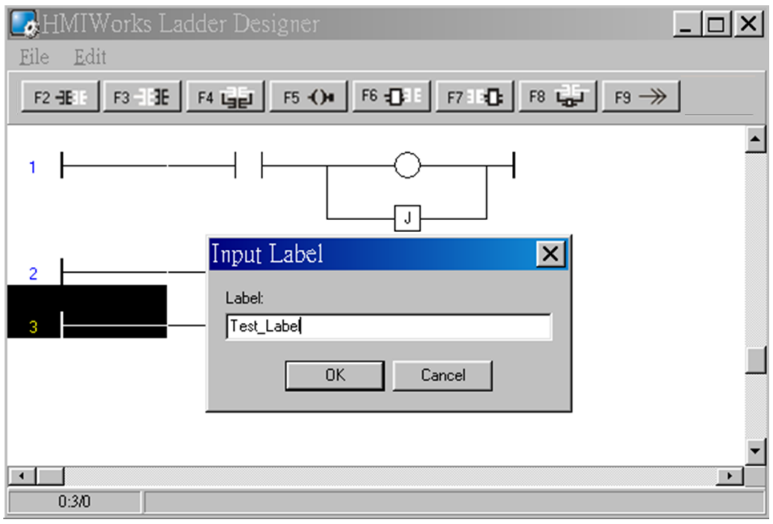
1. Press **F2** three times to create three rungs for example.



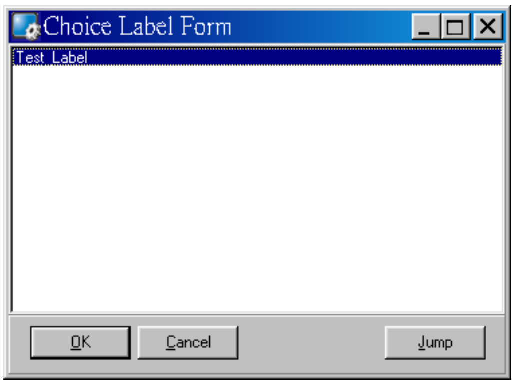
2. Move the cursor to the coil output of the first rung and then press **F9** to add a Jump.

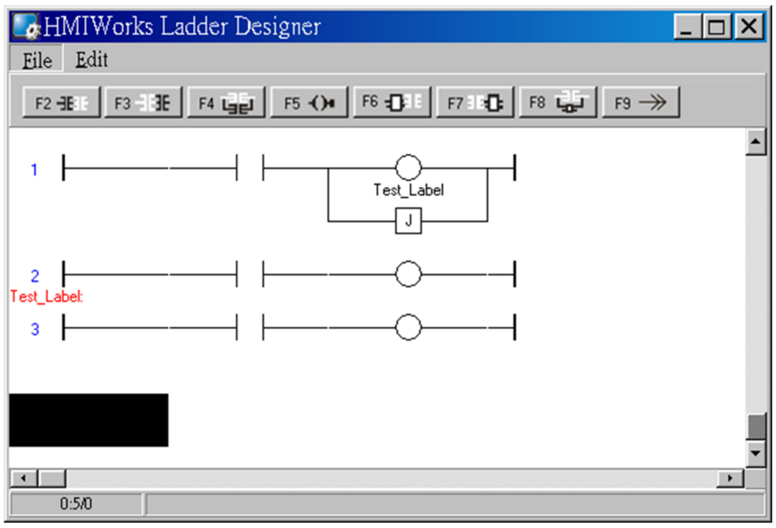


3. Double click on the starting point of the third rung to add a label “Test_Label” to it.



4. Double click on the Jump of the first rung to associate with the label of the third rung.





5. When running the ladder logic, set the coil output of the first rung to high, skip the second rung and jump to the third rung if the contact input of the first rung is closed.

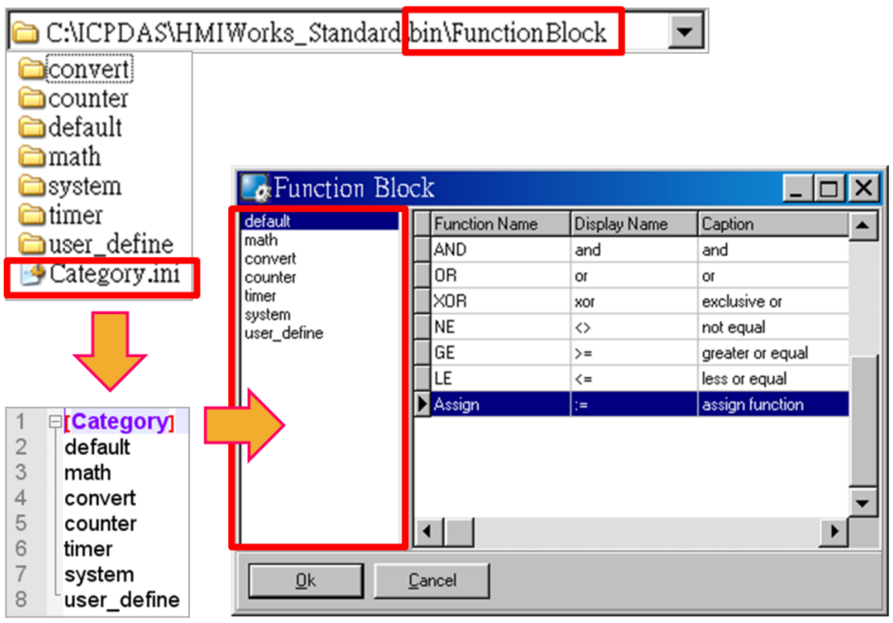
5.3.4. User-Defined Function Block

Why should we use function block?
There may be cases that using only ladders is too complex. At that time, using a function block may be a good choice.

To know how to add a user-defined function block, we first explain how HMIWorks uses these function blocks. Take “Assign” function block in the “default” group for example.

How HMIWorks Uses Function Blocks

1. Go to the installation path of the HMIWorks software. In the sub-directory, “bin\FunctionBlock”, of that installation path, open the file “Category.ini” to load the groups.

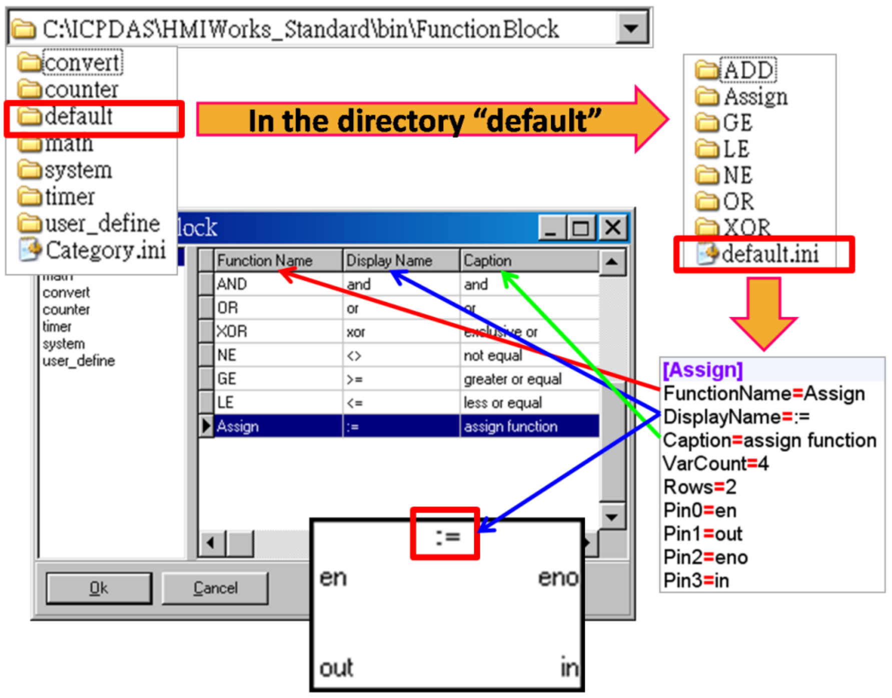


```
C:\ICPDAS\HMIWorks_Standard\bin\FunctionBlock
convert
counter
default
math
system
timer
user_define
Category.ini
```

```
[Category]
default
math
convert
counter
timer
system
user_define
```

Function Name	Display Name	Caption
AND	and	and
OR	or	or
XOR	xor	exclusive or
NE	<>	not equal
GE	>=	greater or equal
LE	<=	less or equal
Assign	:=	assign function

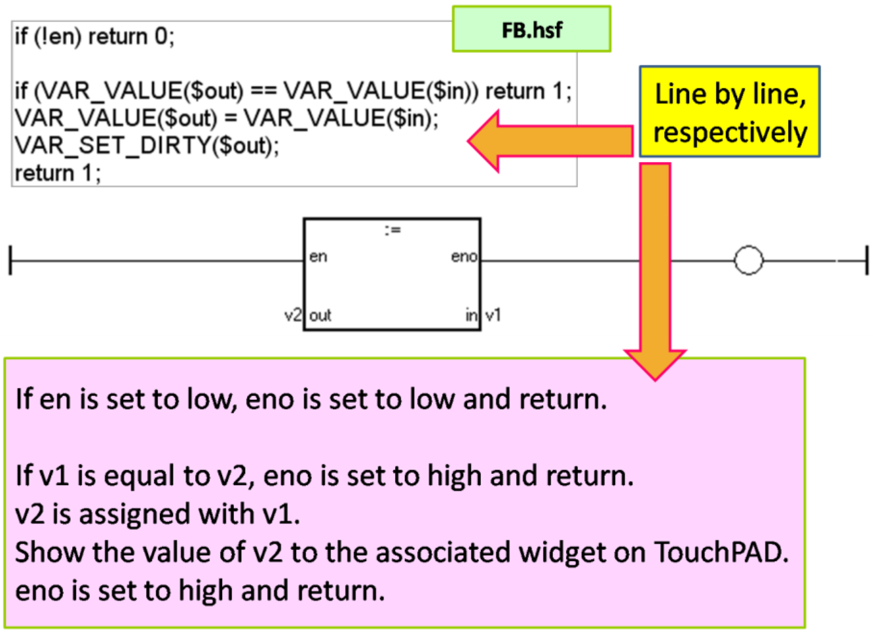
2. If we choose the “default” group, then HMIWorks opens the matching-name sub-directory and then loads from the matching-name “.ini” file in that sub-directory. That is, the “default.ini” in the sub-directory “default”.



Function Name	Display Name	Caption
AND	and	and
OR	or	or
XOR	xor	exclusive or
NE	<>	not equal
GE	>=	greater or equal
LE	<=	less or equal
Assign	:=	assign function

```
[Assign]
FunctionName=Assign
DisplayName=:=
Caption=assign function
VarCount=4
Rows=2
Pin0=en
Pin1=out
Pin2=eno
Pin3=in
```

3. Double click on the "Assign" to use it in the **Ladder Designer**. The **Ladder Designer** uses the logics defined in the file "FB.hsf" in the sub-directory "Assign". FB.hsf is based on the C language. The following figure explains what FB.hsf of the "Assign" function does.



```
if (!en) return 0;

if (VAR_VALUE($out) == VAR_VALUE($in)) return 1;
VAR_VALUE($out) = VAR_VALUE($in);
VAR_SET_DIRTY($out);
return 1;
```

If en is set to low, eno is set to low and return.

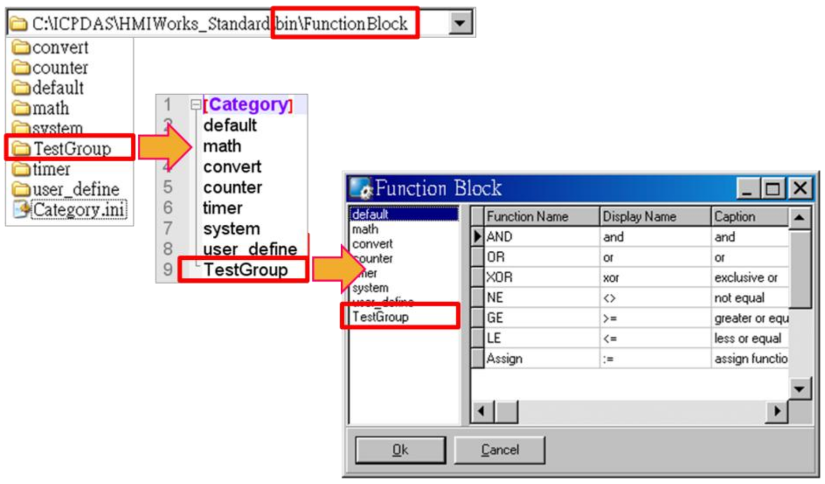
If v1 is equal to v2, eno is set to high and return.
v2 is assigned with v1.
Show the value of v2 to the associated widget on TouchPAD.
eno is set to high and return.

Adding a User-Defined Function Block

Now, we introduce how to add a user-defined function block.

1. Create a new group if necessary.

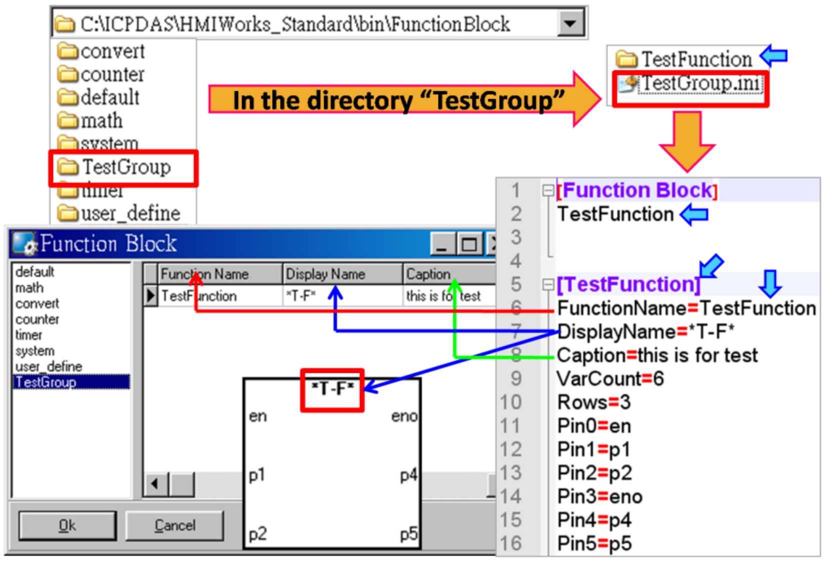
Go to the installation path of HMIWorks. In the sub-directory of “bin\FunctionBlock”, create a new directory “TestGroup” for example and open the file “Category.ini” to add a new item to represent the new group. **Note**: The name of the new item in the Category.ini **must** be exactly the same as the name of the newly-created directory.



```
[Category]
default
math
convert
counter
timer
system
user_define
TestGroup
```

Function Name	Display Name	Caption
AND	and	and
OR	or	or
XOR	xor	exclusive or
NE	<>	not equal
GE	>=	greater or equ
LE	<=	less or equal
Assign	:=	assign functio

2. Go to the directory “TestGroup”, create a .ini file of the exactly same name as that of the group, that is, “TestGroup”. Create a sub-directory of the “TestGroup” directory and we may call the sub-directory “TestFunction”. Finally, define a new function, “TestFunction” in the file “TestGroup.ini”.

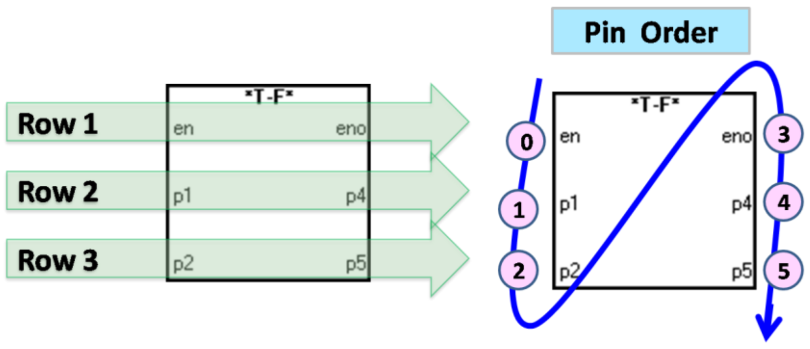


Function Name	Display Name	Caption
TestFunction	*T-F*	this is for test

```
[Function Block]
TestFunction


[TestFunction]
FunctionName=TestFunction
DisplayName=*T-F*
Caption=this is for test
VarCount=6
Rows=3
Pin0=en
Pin1=p1
Pin2=p2
Pin3=eno
Pin4=p4
Pin5=p5
```

Note: VarCount = pin counts.

Below shows what does the Row mean and the order of the pins.



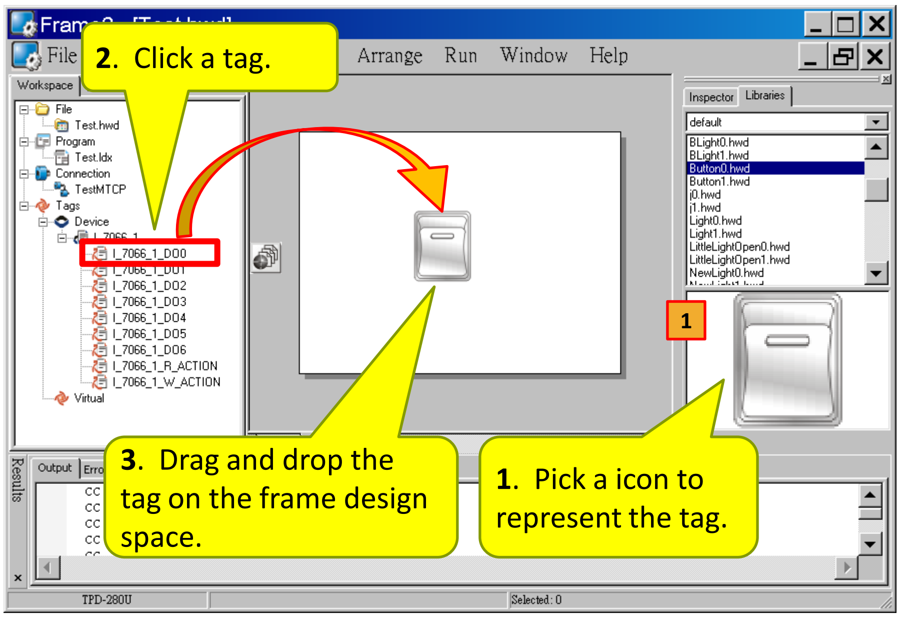
3. In the directory “TestFunction”, create a new file FB.hsf to implement the user-defined function.

5.3.5. Associate Tags with Tools

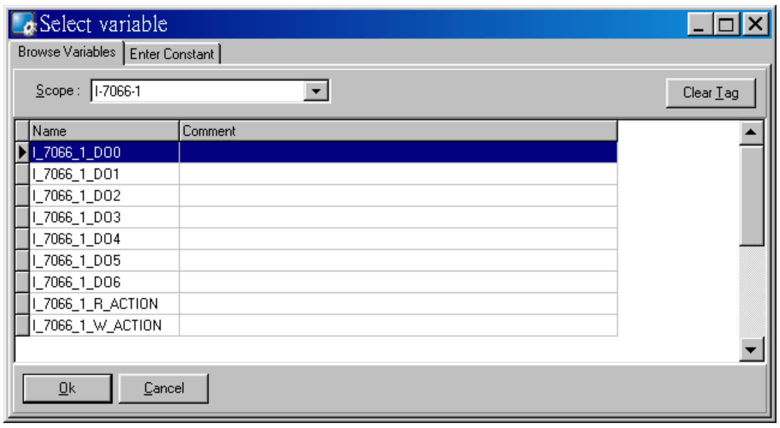
In order to use **Ladder Designer** to build HMI of TouchPAD, we should associate tags with tools.

There are three methods to associate tools with tags. Every change of the tag in the **Ladder Designer** is updated to the tool in the run time after association.

1. The first method: simply drag and drop the tags in the **Workspace** to the frame design area. A CheckBox component is created with the tag associated.
   Note: this feature is only supported for the CheckBox components.


2. Click a tag.
3. Drag and drop the tag on the frame design space.
1. Pick a icon to represent the tag.
1

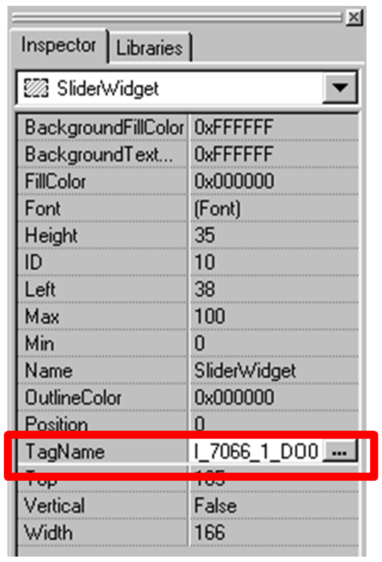
2. The second method: double click the widget on the frame design area to open the “**Select variable**” window. Take a Slider for example.



Scope : I-7066-1

Name	Comment
I_7066_1_DO0	
I_7066_1_DO1	
I_7066_1_DO2	
I_7066_1_DO3	
I_7066_1_DO4	
I_7066_1_DO5	
I_7066_1_DO6	
I_7066_1_R_ACTION	
I_7066_1_W_ACTION	

Double click on the tag Name you want to associate with the widget. Then you can see the tag is associated with the widget (that is, the Slider for example) by setting the property TagName to the name of the tag.


Inspector | Libraries

SliderWidget

BackgroundFillColor	0xFFFFFF
BackgroundText...	0xFFFFFF
FillColor	0x000000
Font	(Font)
Height	35
ID	10
Left	38
Max	100
Min	0
Name	SliderWidget
OutlineColor	0x000000
Position	0
TagName	I_7066_1_DO0 ...
Top	105
Vertical	False
Width	166

3. The third method is click the "**…**" button from the TagName field in the Inspector to open the "**Select variable**" window. Similar steps as above.

Special Note:
Refer to section "Using an ObjectList". Set the RefObject property of a CheckBox component to an ObjectList component which contains images and then associate a tag to the CheckBox component. Then every time the tag changes its value, the CheckBox component toggles the images. This feature is especially useful when building switches.

5.3.6. User-Defined I/O Modules

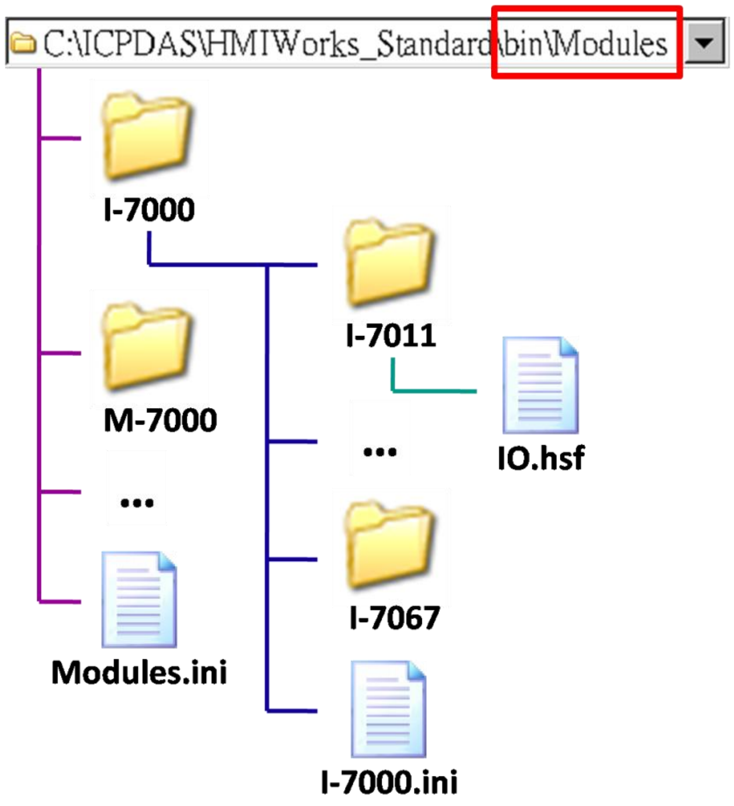
To know how to add a user-defined I/O module, we first explain how HMIWorks uses these I/O modules.

There are several kinds of I/O modules.

- DCON I/O modules: I-7000 series I/O modules by ICP DAS.
http://www.icpdas.com/products/Remote_IO/i-7000/i-7000_introduction.htm
- Modbus TCP I/O modules: ICP DAS provides ET/PET-7000 series.
http://www.icpdas.com/products/Remote_IO/et-7000/et-7000_introduction.htm
- Modbus RTU I/O modules: M-7000 series I/O modules by ICP DAS
http://www.icpdas.com/products/Remote_IO/m-7000/m-7000_introduction.htm

Where HMIWorks Put I/O Module Information

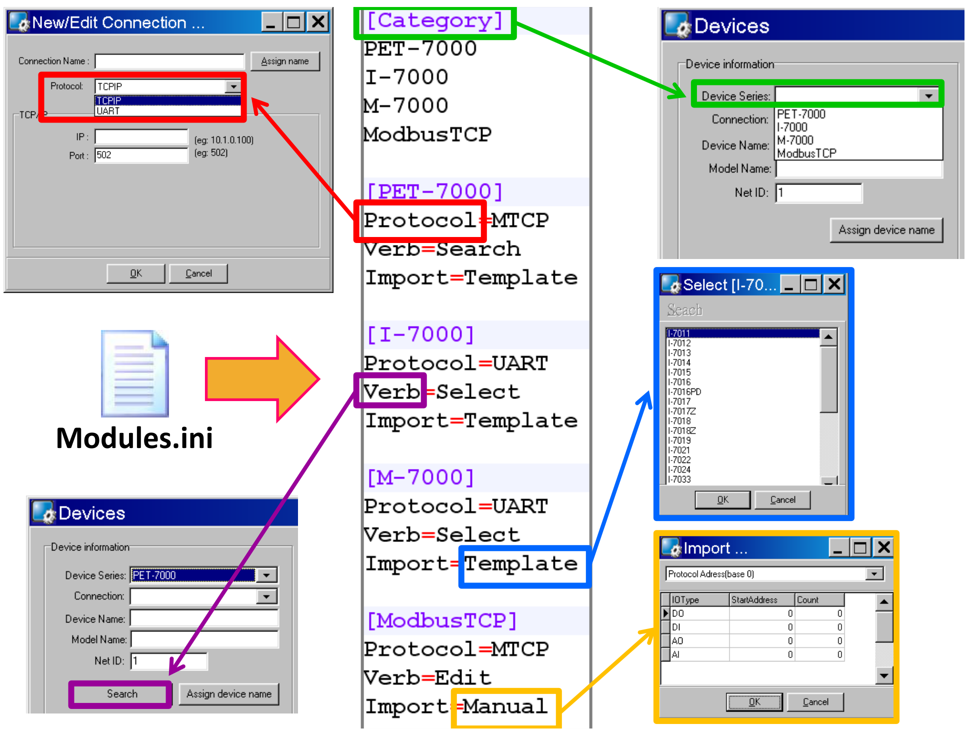
HMIWorks puts I/O module information in the following locations.



Some explanations for above figure:

- "C:\ICPDAS\HMIWorks_Standard\" is the installation path. (Users may have different installation paths.)
- "Modules.ini" is the I/O series configuration file.
- "I-7000.ini" is the configuration file for the I-7000 series I/O modules. "M-7000.ini" and "PET-7000.ini" are configuration file for the M-7000 and the PET-7000 series I/O modules respectively.
- Each I/O module has a matching name directory and in that directory there is only one file, IO.hsf. IO.hsf is the file of the C language to define the behaviors of the I/O module.
- I/O module directories in the same series are grouped together in the I/O series directory. For example, I-7011, …, I-7067 are directories represent I/O modules and they are all put to the series directory "I-7000".

What Module.ini describes?



```
[Category]
PET-7000
I-7000
M-7000
ModbusTCP

[PET-7000]
Protocol=MTCP
Verb=Search
Import=Template

[I-7000]
Protocol=UART
Verb=Select
Import=Template

[M-7000]
Protocol=UART
Verb=Select
Import=Template

[ModbusTCP]
Protocol=MTCP
Verb=Edit
Import=Manual
```

In details, we have the following table:

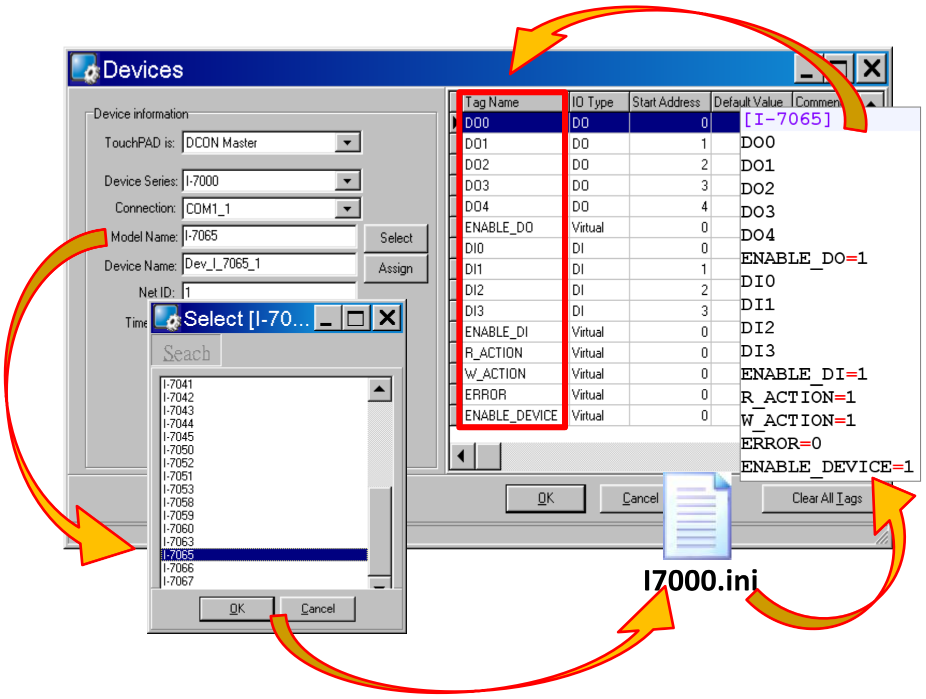
Item		Description
Category		This section keeps the list of the device series which HMIWorks supports. When registering device (**F3**), the "**Devices**" window gets the information of device series from this "Category" section.
Protocol	MTCP	"Protocol=MTCP" in the Module.ini is corresponding to "Protocol=TCPIP" in the "**New/Edit Connection**" window in the **Workspace**.
	UART	"Protocol=UART" in the Module.ini is corresponding to "Protocol=UART" in the "**New/Edit Connection**" window in the **Workspace**.
Verb	Search	HMIWorks scans through the network to find out I/O modules. Until now, PET-7000 is the only series which support this "Search" function.

	Select	HMIWorks pops up a list of I/O modules to let users select one. The list of I/O modules is loaded from the file whose name is [Device_Series_Name].ini
	Edit	HMIWorks opens the “**Import**” window to let users decide the I/O points for the I/O module.
Import	Template	HMIWorks imports the tags of the I/O module from the I/O module configuration file. For example, HMIWorks imports tags of I-7011 from the template in the file of I-7000.ini.
	Manual	HMIWorks imports the tags of the I/O module by the manually-decided I/O points.

Generating Tags by “Register Devices (F3)”

Press **F3** on your keyboard to open the “**Devices**” window to register I/O devices.

The I/O modules configuration file has templates for all the I/O modules in the I/O series. For example, I-7000.ini is the configuration file for the I-7000 series I/O modules.
Take I-7065 in the I-7000 series for example as shown in the following figure.



Device information

TouchPAD is: DCON Master
Device Series: I-7000
Connection: COM1_1
Model Name: I-7065
Device Name: Dev_I_7065_1
Net ID: 1

I-7041
I-7042
I-7043
I-7044
I-7045
I-7050
I-7052
I-7051
I-7053
I-7058
I-7059
I-7060
I-7063
I-7065
I-7066
I-7067

Tag Name	IO Type	Start Address
DO0	DO	0
DO1	DO	1
DO2	DO	2
DO3	DO	3
DO4	DO	4
ENABLE_DO	Virtual	0
DI0	DI	0
DI1	DI	1
DI2	DI	2
DI3	DI	3
ENABLE_DI	Virtual	0
R_ACTION	Virtual	0
W_ACTION	Virtual	0
ERROR	Virtual	0
ENABLE_DEVICE	Virtual	0

```
[I-7065]
DO0
DO1
DO2
DO3
DO4
ENABLE_DO=1
DI0
DI1
DI2
DI3
ENABLE_DI=1
R_ACTION=1
W_ACTION=1
ERROR=0
ENABLE_DEVICE=1
```

As above, ERROR is the tag for the communication status.

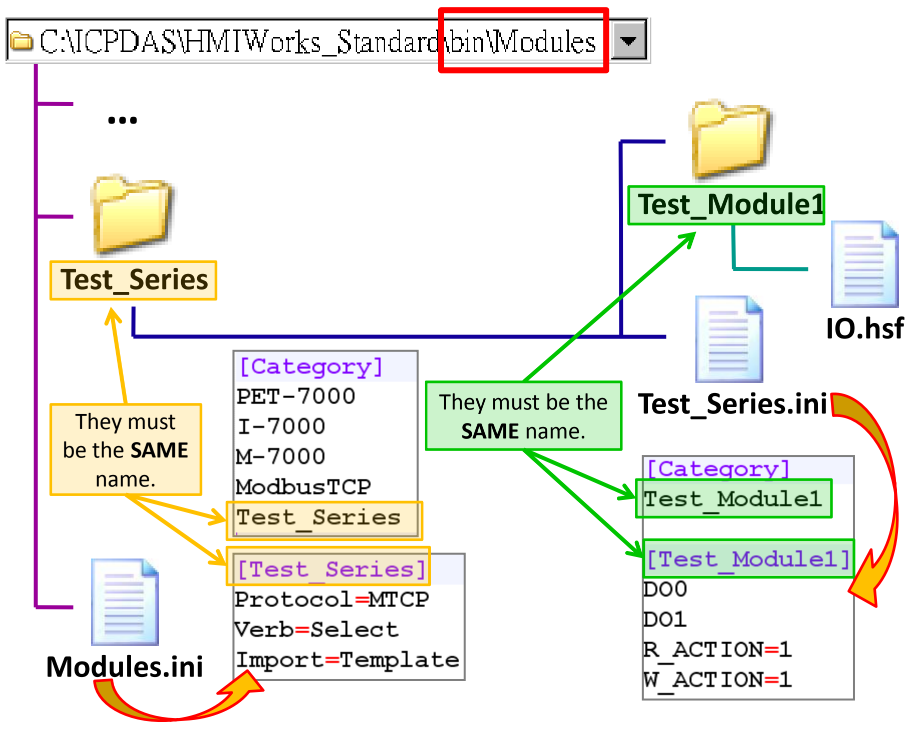
Defining I/O Behaviors in IO.hsf

- Take I-7065 for example (I-7000 series I/O module)
  Open the IO.hsf in the directory “[HMIWorks install path]\bin\Modules\I-7000\I-7065\”.
  The codes in IO.hsf are of C language as below:

```
BEGIN_FUNCTION_BLOCK(); //this line is necessary

DWORD v_do = 0;
DWORD v_di = 0;
int     gWriteCount = 0;

uart_SetTimeout($DEVICE, $TIMEOUT);

//$W_ACTION: a tag used in Ladder to enable/disable writing actions
//$ENABLE_DO: a tag used in Ladder to enable/disable the part of DOs
if ( VAR_VALUE($ENABLE_DO) && VAR_VALUE($W_ACTION))
{
    int iWrite = 0; //To decide if there’s a need to write any DO channel
```

```
        v_do     = 0;

        // Update the status for each channel if it has been changed.
        iWrite += VAR_GET_WRITE_U32(&v_do, $DO0, 0);
        iWrite += VAR_GET_WRITE_U32(&v_do, $DO1, 1);
        iWrite += VAR_GET_WRITE_U32(&v_do, $DO2, 2);
        iWrite += VAR_GET_WRITE_U32(&v_do, $DO3, 3);
        iWrite += VAR_GET_WRITE_U32(&v_do, $DO4, 4);

        if ( iWrite )    // Write only when need
        {
            gWriteCount++;
            if ( ! dcon_WriteDO($DEVICE, $NETID, 5, v_do & 0xFF) )
            // dcon_WriteDO: the DO writing API function of I-7000 I/O series.
            // I-7000 I/O series uses the DCON protocol.
                 return HMI_ERROR;
        }
    }

    if ( gWriteCount ) return HMI_OK;
    // Skip reading to reduce the device loading

    if ( (VAR_VALUE($ENABLE_DO) || VAR_VALUE($ENABLE_DI)) &&
    VAR_VALUE($R_ACTION)) {
    //$R_ACTION: a tag used in Ladder to enable/disable reading actions
    //$ENABLE_DO: a tag used in Ladder to enable/disable the part of DOs
    //$ENABLE_DI: a tag used in Ladder to enable/disable the part of DIs
    if (dcon_ReadDIO($DEVICE, $NETID, 4, 5, &v_di, &v_do))
    // dcon_ReadDIO: the DI/DO reading API function of I-7000 I/O series.
    // I-7000 I/O series uses the DCON protocol.
    {
         VAR_SET($DI0, v_di & (1<<0));
         // VAR_SET: used to set the value of this channel to its tag
         VAR_SET($DI1, v_di & (1<<1));
         VAR_SET($DI2, v_di & (1<<2));
         VAR_SET($DI3, v_di & (1<<3));

         VAR_SET($DO0, v_do & (1<<0));
         VAR_SET($DO1, v_do & (1<<1));
         VAR_SET($DO2, v_do & (1<<2));
         VAR_SET($DO3, v_do & (1<<3));
         VAR_SET($DO4, v_do & (1<<4));
    } else
         return HMI_ERROR;
    }

    END_FUNCTION_BLOCK(); //this line is necessary
```

Creating a User-Defined I/O Module


C:\ICPDAS\HMIWorks_Standard\bin\Modules
...
Test_Series
Test_Module1
IO.hsf
Test_Series.ini
Modules.ini
They must be the SAME name.
They must be the SAME name.

Modules.ini:

```
[Category]
PET-7000
I-7000
M-7000
ModbusTCP
Test_Series

[Test_Series]
Protocol=MTCP
Verb=Select
Import=Template
```

Test_Series.ini:

```
[Category]
Test_Module1

[Test_Module1]
DO0
DO1
R_ACTION=1
W_ACTION=1
```

1. In the directory, “[HMIWorks install path]\bin\Modules\”, create a new I/O series directory whose name is “Test_Series” and be sure to update Modules.ini to notify HMIWorks that there is a new I/O series called “Test_Series”. As the figure shows, the series directory name and the name in the Modules.ini must be **the same**.
2. In the I/O series directory, “Test_Series”, we create a new I/O module directory whose name is “Test_Module1” and be sure to create a I/O modules configuration file, Test_Series.ini, to depict the template of the newly-created I/O module, Test_Module1. As the figure shows, the

module directory name and the name in the Test_Series.ini must be **the same**.

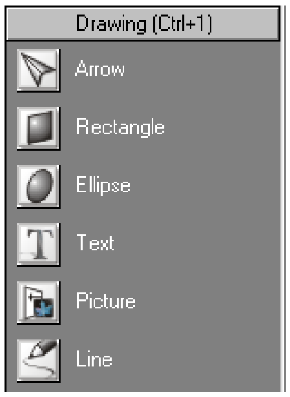
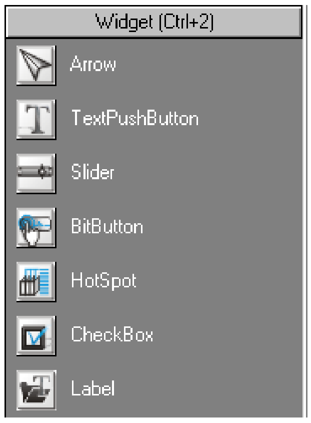
3. Implement the IO.hsf which is created in I/O module directory, Test_Module1, to describe the behaviors of the I/O module, Test_Module1. Refer to the IO.hsf
   I. of PET-7000 series if using the Modbus TCP protocol.
   II. of M-7000 series if using the Modbus RTU protocol.
   III. of I-7000 series if using the DCON protocol.

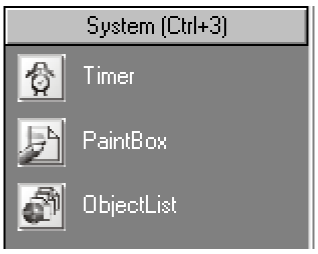
   All are similar to the example of the I-7065 above.

5.4. Frames and Tools

This section introduces properties and usages of frames and tools.

In the **Toolbox**, there are three kinds of tools, the Drawing, the Widget and the System components.

 Drawing (Ctrl+1) Arrow Rectangle Ellipse Text Picture Line	**Drawing:** 1. **Rectangle**: draw a rectangle. 2. **Ellipse**: draw ellipse. 3. **Text**: put string (text) on screen. 4. **Picture**: load an image file on a frame. 5. **Line**: draw a line.
 Widget (Ctrl+2) Arrow TextPushButton Slider BitButton HotSpot CheckBox Label	**Widget**: 1. **TextPushButton**: create a button. 2. **Slider**: show or decide the percentage. 3. **BitButton**: create an image button. 4. **HotSpot**: create a hot spot that can issue an OnClick event. 5. **CheckBox**: provide an alternative. 6. **Label**: provide a string that can be

	modified during the run-time.
	**System:** 1. **Timer**: periodically execute codes. 2. **PaintBox**: draw shapes in the run time. 3. **ObjectList**: maintain a list of library objects which can be used through property "RefObject" of TextPushButton and CheckBox.

Important Notice:

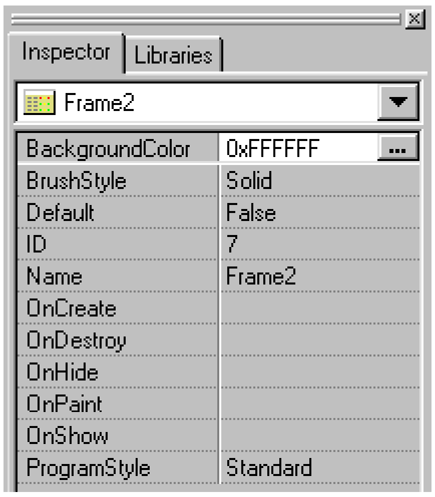
1. Make sure that widget component should not overlap or unexpected behavior may happen when clicking.
2. The touch area of a widget component is the rectangle enclosed by the widget's outline.

5.4.1. Properties of a Frame

This section introduces the properties of a frame.

Properties of a Frame

Click on the frame, and the properties of the frame are shown in the **Inspector**.

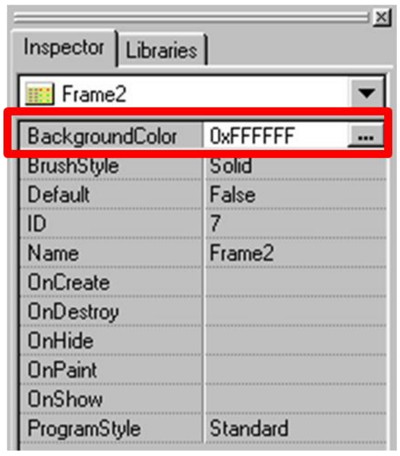


BackgroundColor	0xFFFFFF
BrushStyle	Solid
Default	False
ID	7
Name	Frame2
OnCreate	
OnDestroy	
OnHide	
OnPaint	
OnShow	
ProgramStyle	Standard

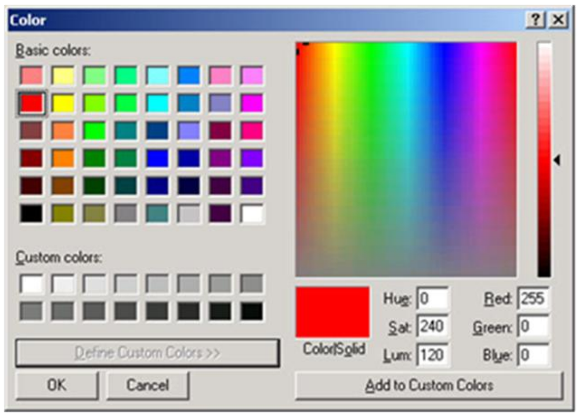
properties	description
BackgroundColor	The background color of the frame. The color is represented by a three-byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
BrushStyle	Solid or Clear. If BrushStyle is set to “Solid”, then the setting of the “BackgroundColor” property does take effect. However this may make the **screen flash** if background color is quite different from the loaded picture. Setting BrushStyle Clear disables the “BackgroundColor” property and prevents the screen from flashing.
Default	Whether this frame is default frame or not. The default frame is displayed first after the TouchPAD device turns on.
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Name	The name of the frame
OnCreate	The function name of the OnCreate event handler of the frame. Use OnCreate to perform some operations when the frame is created.
OnDestroy	The function name of the OnDestroy event handler of the frame. Use OnDestroy to perform some operations when the frame is destroyed.
OnHide	The function name of the OnHide event handler of the frame. Use OnHide to perform some operations when the frame is hidden.
OnPaint	The function name of the OnPaint event handler of the frame. Use OnPaint to perform some operations when the frame is redrawn.
OnShow	The function name of the OnShow event handler of the frame. Use OnShow to perform some operations when the frame is shown.
ProgramStyle	Standard C or Ladder

Changing the BackgroundColor of a frame

Click on the “BackgroundColor” field in the **Inspector**. Then click on the “**…**” button to open the color window to select a color.



BackgroundColor	0xFFFFFF
BrushStyle	Solid
Default	False
ID	7
Name	Frame2
OnCreate	
OnDestroy	
OnHide	
OnPaint	
OnShow	
ProgramStyle	Standard



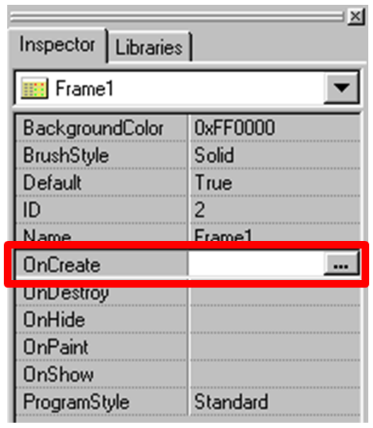
Hue: 0 Sat: 240 Lum: 120 Red: 255 Green: 0 Blue: 0

Implementing event handlers of a frame

There are five event handlers of a frame, OnCreate, OnDestroy, OnHide, OnPaint, and OnShow.

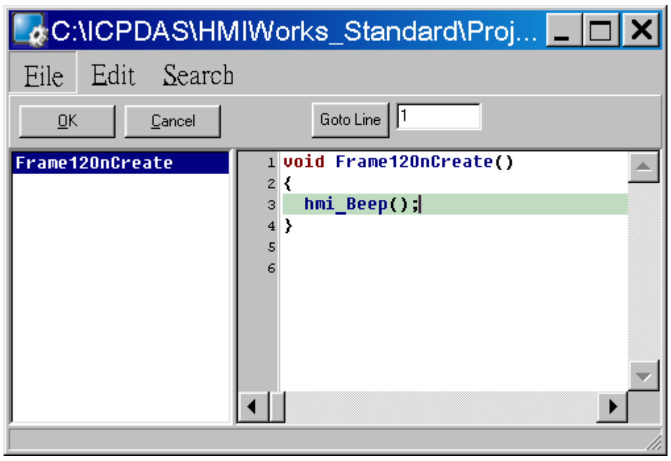
Take OnCreate event handler for example.

1. Click on the “OnCreate” field in the **Inspector**. Then click on the “**…**” button to open the programming window.



BackgroundColor	0xFF0000
BrushStyle	Solid
Default	True
ID	2
Name	Frame1
OnCreate	
OnDestroy	
OnHide	
OnPaint	
OnShow	
ProgramStyle	Standard

2. Here we use hmi_Beep() to sound a beep for example.



```
void Frame12OnCreate()
{
  hmi_Beep();
}
```

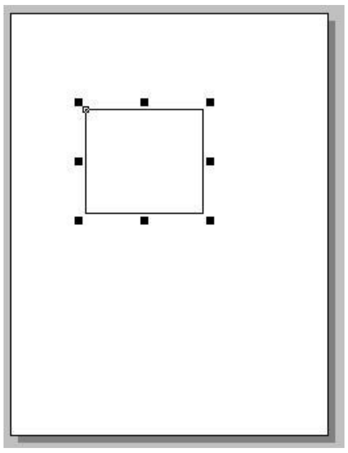
3. Press **OK** to save the file and leave.

5.4.2. Drawing a Rectangle

This section shows how to draw a rectangle.

Drawing a rectangle

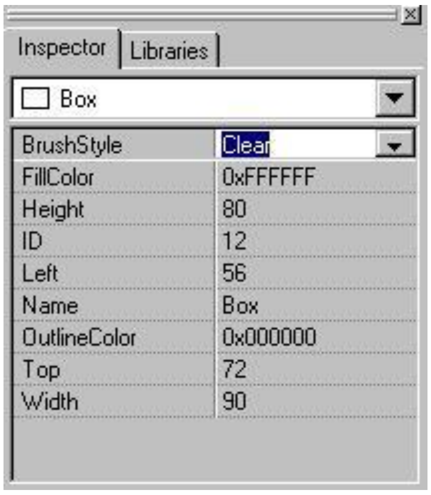
1. Click the Rectangle icon from the Drawing panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized rectangle.



PS. What to do if I want to draw a square?

Step 2 with the "**Ctrl**" key pressed at the same time.

Properties of Rectangle



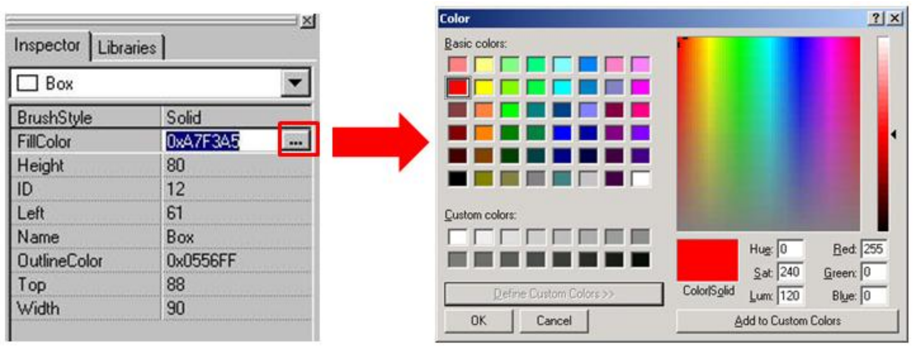
BrushStyle	Clear
FillColor	0xFFFFFF
Height	80
ID	12
Left	56
Name	Box
OutlineColor	0x000000
Top	72
Width	90

properties	description
BrushStyle	The style used to fill to a rectangle
FillColor	The color used to fill the rectangle. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
Height	The length of the vertical side of the rectangle
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers

	are used to identify them.
Left	The x-coordinate of the left-top vertex of the rectangle
Name	The name of the rectangle
OutlineColor	The outline color of the rectangle
Top	The y-coordinate of the left-top vertex of the rectangle
Width	The length of the horizontal side of the rectangle

Changing the FillColor and OutlineColor

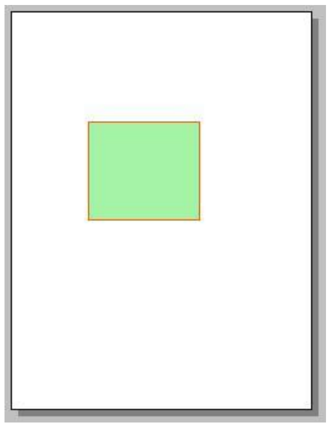
Click on the “FillColor” field in the **Inspector**. Then click on the “**…**” button to open the color window to select a color. Repeat the same procedure for the “OutlineColor” field.



BrushStyle	Solid
FillColor	0xA7F3A5
Height	80
ID	12
Left	61
Name	Box
OutlineColor	0x0556FF
Top	88
Width	90

Hue: 0　Sat: 240　Lum: 120　Red: 255　Green: 0　Blue: 0

For example, set “FillColor” to green and “OutlineColor” to red and then you may have the results as shown below.

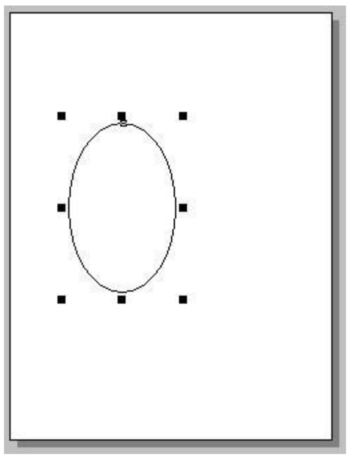


5.4.3. Drawing an Ellipse

This section shows how to draw an ellipse.

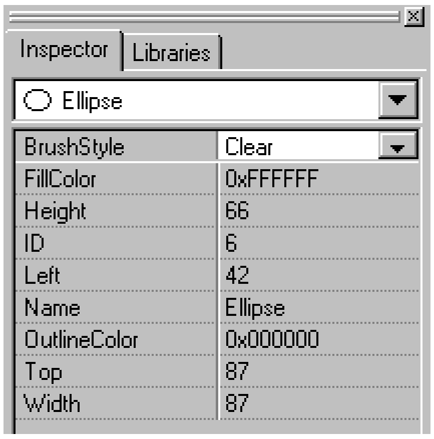
Drawing an ellipse

1. Click the Ellipse icon from the Drawing panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized ellipse.



PS. What to do if I want to draw a circle?
Step 2 with the "**Ctrl**" key pressed at the same time.

Properties of Ellipse

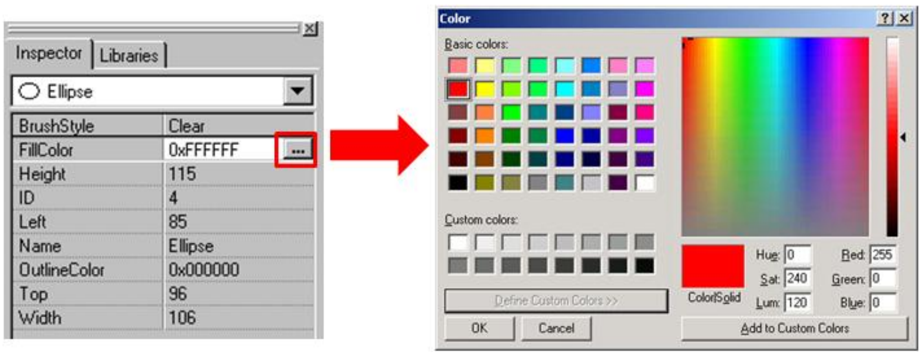


BrushStyle	Clear
FillColor	0xFFFFFF
Height	66
ID	6
Left	42
Name	Ellipse
OutlineColor	0x000000
Top	87
Width	87

properties	description
BrushStyle	The style used to fill to an ellipse
FillColor	The color used to fill the ellipse. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
Height	The length of the vertical side of the rectangle that inscribes the ellipse to draw
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the rectangle that inscribes the ellipse to draw
Name	The name of the ellipse
OutlineColor	The outline color of the rectangle that inscribes the ellipse to draw
Top	The y-coordinate of the left-top vertex of the rectangle that inscribes the ellipse to draw
Width	The length of the horizontal side of the rectangle that inscribes the ellipse to draw

Changing the FillColor and OutlineColor

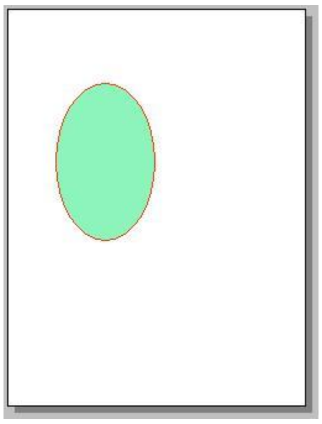
Click on the “FillColor” field in the **Inspector**. Then click on the “…” button to open the color window to select a color. Repeat the same procedure for the “OutlineColor” field.


Inspector | Libraries

Ellipse

BrushStyle	Clear
FillColor	0xFFFFFF
Height	115
ID	4
Left	85
Name	Ellipse
OutlineColor	0x000000
Top	96
Width	106

For example, set “FillColor” to green and “OutlineColor” to red and then you may have the results as shown below.

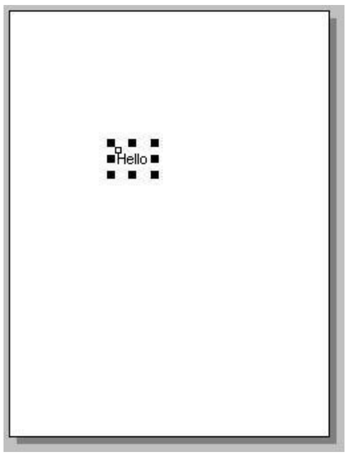


5.4.4. Drawing a Text

This section shows how to draw a Text.

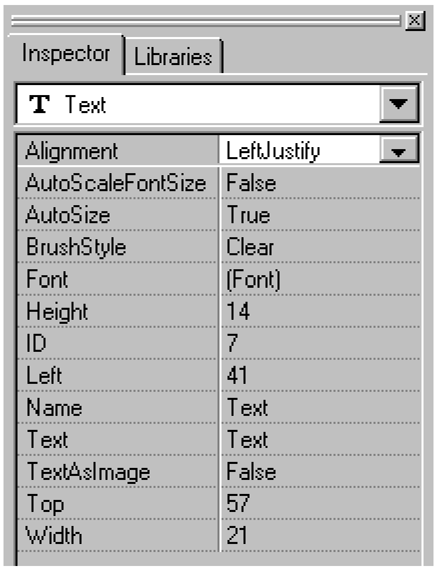
Drawing a Text

1. Click the Text icon from the Drawing panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click to put a Text on it.
3. Specify the Text field in the **Inspector** with “Hello”, for example.



4. Or you can simply copy an text from the clipboard and paste it on the frame design area of HMIWorks. HMIWorks then create a Text component and then load the string from clipboard automatically.

Properties of Text



Alignment	LeftJustify
AutoScaleFontSize	False
AutoSize	True
BrushStyle	Clear
Font	(Font)
Height	14
ID	7
Left	41
Name	Text
Text	Text
TextAsImage	False
Top	57
Width	21

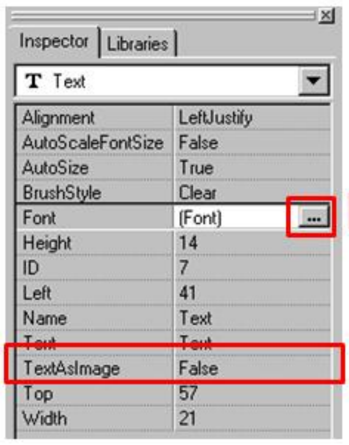
properties	description
Alignment	This property determines where to locate the string, Left, right, or center. (LeftJustify, RightJustify, or Center) Note: This property is enabled only when AutoSize=True
AutoScaleFontSize	Automatically scale the font size to fit the rectangle which encloses the Text.

	Note: This property is enabled only when AutoSize=True.
AutoSize	True or False. This property is used to indicate that whether the size of the rectangle which encloses Text can be automatically changed to cover the whole string.
BrushStyle	The style used to fill the rectangle that encloses the Text
Font	The font of the Text. Note: This property is enabled only when TextAsImage=True.
Height	The length of the vertical side of the rectangle that encloses the Text to draw
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the rectangle that encloses the Text to draw
Name	The name of the Text
Text	The string of the Text component to be displayed
TextAsImage	True or False. Whether the text is stored as an image or not. If the text is treated as an image, it will take more space to store and more time to download.
Top	The y-coordinate of the left-top vertex of the rectangle that encloses the Text to draw
Width	The length of the horizontal side of the rectangle that encloses the Text to draw

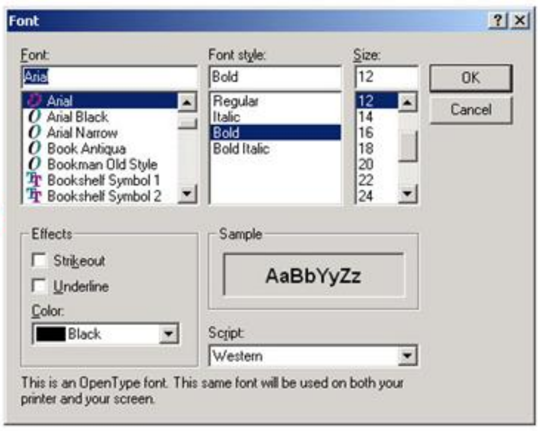
Changing the font of Text

Click the "Font" field in the **Inspector**. Then click on the "…" button to open the font window to change the font.

Be sure to set TextAsImage to True. Otherwise the changed font settings do not take effect.



Alignment	LeftJustify
AutoScaleFontSize	False
AutoSize	True
BrushStyle	Clear
Font	(Font)
Height	14
ID	7
Left	41
Name	Text
Text	Text
TextAsImage	False
Top	57
Width	21



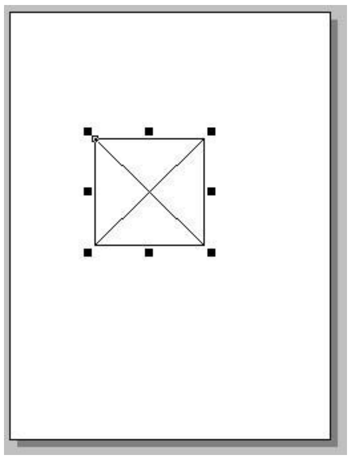
This is an OpenType font. This same font will be used on both your printer and your screen.

5.4.5. Loading a Picture

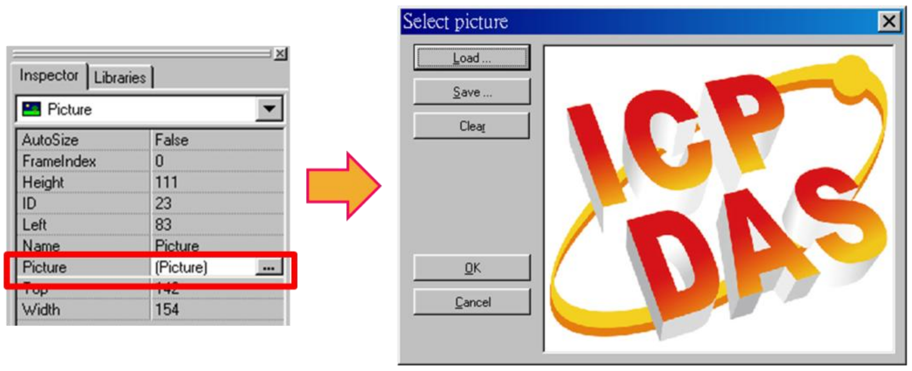
This section shows how to load a Picture.

Loading a Picture

1. Click the Picture icon from the Drawing panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized picture box.

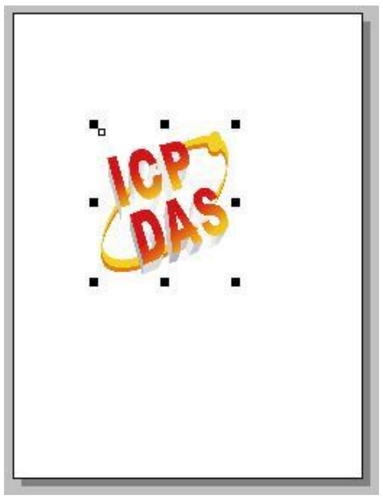


3. Click the “Picture” field in the **Inspector**. Then click on the “…” button to open the “**Select Picture**” window to load a picture.



AutoSize	False
FrameIndex	0
Height	111
ID	23
Left	83
Name	Picture
Picture	(Picture)
Top	142
Width	154

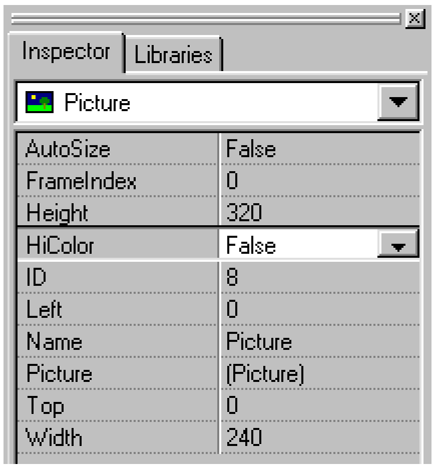
4. The frame with the loaded picture as shown below.



5. Or you can just copy an image from the clipboard and paste it on the frame design area of HMIWorks. HMIWorks create a Picture

component and then load the image from clipboard automatically.

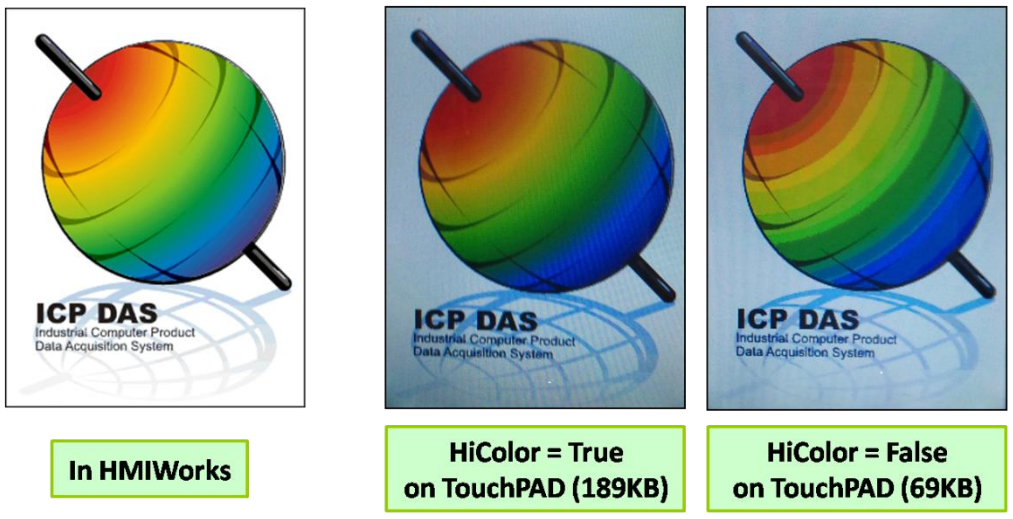
Properties of Picture



AutoSize	False
FrameIndex	0
Height	320
HiColor	False
ID	8
Left	0
Name	Picture
Picture	(Picture)
Top	0
Width	240

properties	description
AutoSize	True or False. This property is used to indicate that whether the size of the Picture can be changed or not.
FrameIndex	Ignored
Height	The length of the vertical side of the rectangle that encloses the Picture to load
HiColor	True or False. This property decides whether the loaded picture is stored as 16-bit color (True) or 8-bit color (False). The default option is 8-bit color.
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the rectangle that encloses the Picture to load
Name	The name of the Picture
Picture	The picture to be loaded
Top	The y-coordinate of the left-top vertex of the rectangle that encloses the Picture to load
Width	The length of the horizontal side of the rectangle that encloses the Picture to load

Trade-off between firmware size and resolution


In HMIWorks
HiColor = True on TouchPAD (189KB)
HiColor = False on TouchPAD (69KB)

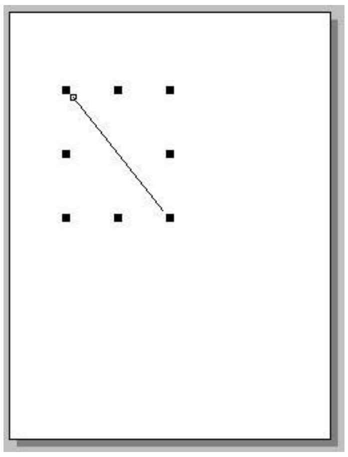
Above is the comparison between “HiColor = True” and “HiColor = False”. The left picture is original one in HMIWorks. The two right-side pictures are real photos. One is “HiColor = True” and the other is “HiColor = False”.
As you can see, setting HiColor to False makes the photo have a not-smooth gradient part while setting HiColor to True does not. Because 8-bit color does not have enough color (256 only) to represent the picture, similar colors are represented by the same color and this results in not-smooth gradient.
However, preventing pictures from not-smooth gradient costs TouchPAD bigger size of memory. Take above picture for example, setting HiColor to True uses memory of 189KB but setting HiColor to False costs only 69KB.

5.4.6. Drawing a Line

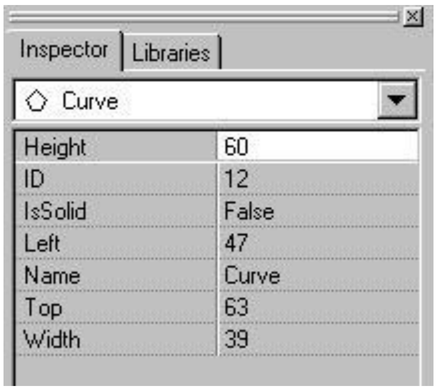
This section shows how to draw a line segment.

Drawing a line segment:

1. Click the Line icon from the Drawing panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized line.



Properties of Line



Height	60
ID	12
IsSolid	False
Left	47
Name	Curve
Top	63
Width	39

properties	description
Height	The length of the vertical side of the rectangle whose diagonal line is the line segment to draw
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
IsSolid	Ignored
Left	The x-coordinate of the left-top vertex of the rectangle whose diagonal line is the line segment to draw
Name	The name of the line segment
Top	The y-coordinate of the left-top vertex of the

	rectangle whose diagonal line is the line segment to draw
Width	The length of the horizontal side of the rectangle whose diagonal line is the line segment to draw

5.4.7. Using a TextPushButton

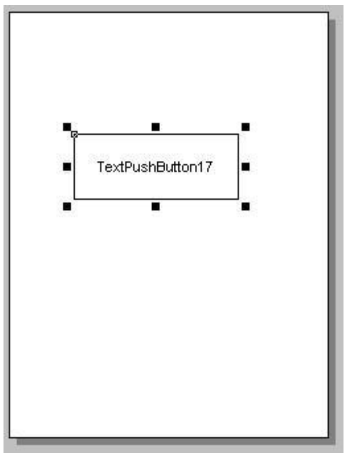
This section shows how to use a TextPushButton.

What is a TextPushButton?

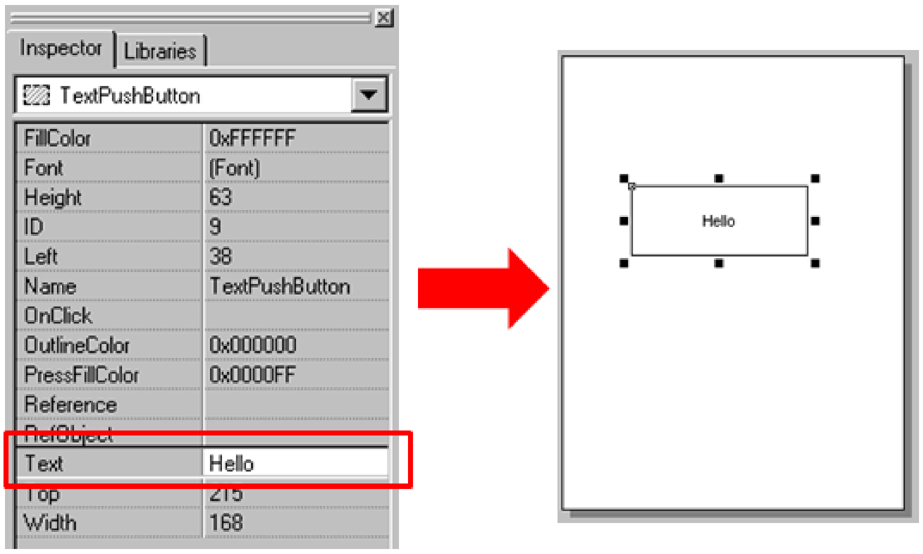
A TextPushButton is a button with a Text on it. When a TextPushButton is pressed and not released, the status is changed. But the status is restored back to the original state after you release it.

Using a TextPushButton:

1. Click the TextPushButton icon from the Widget panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized TextPushButton.

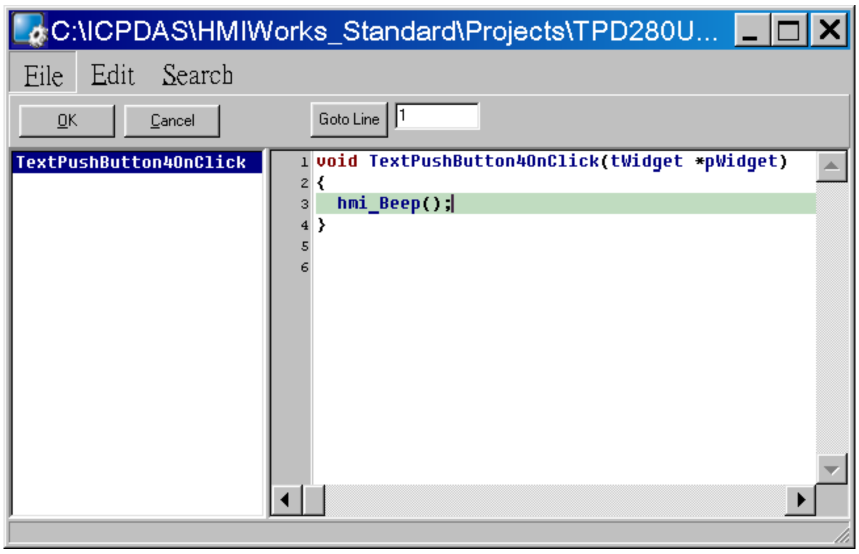


3. Click the Text field in the **Inspector** to change the string on the TextPushButton. Here we change the Text to “Hello”.



FillColor	0xFFFFFF
Font	(Font)
Height	63
ID	9
Left	38
Name	TextPushButton
OnClick	
OutlineColor	0x000000
PressFillColor	0x0000FF
Reference	
RefObject	
Text	Hello
Top	215
Width	168

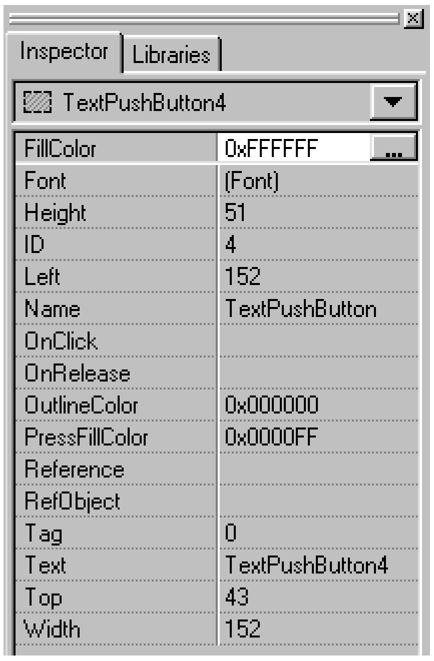
4. Double click the TextPushButton on the frame design area to open the programming window. Write the On-Click event handler in it. Here we use hmi_Beep() to sound a beep for example.
Note: The property “OnClick” is supported only in the programming type “Standard C”.



```
void TextPushButton4OnClick(tWidget *pWidget)
{
  hmi_Beep();
}
```

5. Press **OK** to save the file and leave.

Properties of TextPushButton



FillColor	0xFFFFFF
Font	(Font)
Height	51
ID	4
Left	152
Name	TextPushButton
OnClick	
OnRelease	
OutlineColor	0x000000
PressFillColor	0x0000FF
Reference	
RefObject	
Tag	0
Text	TextPushButton4
Top	43
Width	152

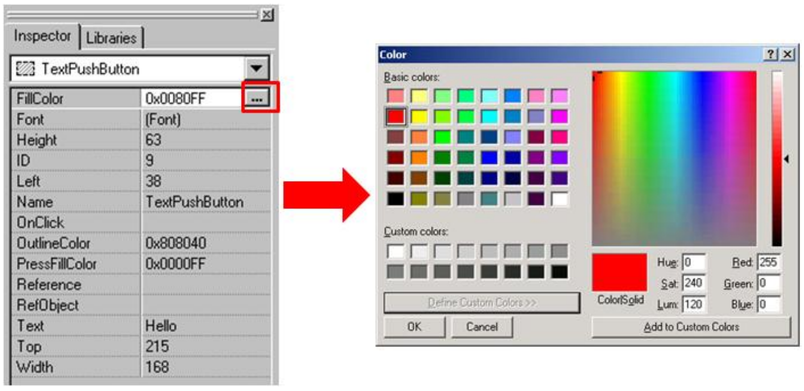
properties	description
FillColor	The color used to fill the TextPushButton. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.

Font	The font of the text. Note that the only the font style and the font size are effective.
Height	The length of the vertical side of the TextPushButton
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the TextPushButton
Name	The name of the TextPushButton
OnClick	The function name of the on-click event handler of the TextPushButton. **Note**: Supported only in the programming type "Standard C".
OnRelease	The function name of the on-release event handler of the TextPushButton. **Note**: Supported only in the programming type "Standard C".
OutlineColor	The outline color of the TextPushButton
PressFillColor	The color used to fill the TextPushButton when the TextPushButton is touched (but not yet released)
Reference	The reference to a frame. That is, when pressing on the TextPushButton, TouchPAD goes to the frame you specified in this property. **Note**: the **priority** of the property "Reference" is higher than that of "OnClick".
RefObject	The reference to the object list. An object list is a component that can be selected in the **Toolbox** to maintain a list of the elements of the **library**. Refer to "Using an ObjectList" section for details.
Tag	The variable used for programming purpose. For example, it can be assigned a unique number for each TextPushButton component in order to identify them. Refer to the <<API Reference>> for functions to get/set the Tag property.

	Note: This Tag has nothing to do with the “Tag” which the TagName property refers to.
TagName	Associate a variable (tag) in **Ladder Designer**. **Note**: The property is supported only in programming type “Ladder”.
Text	The string of the TextPushButton
Top	The y-coordinate of the left-top vertex of the TextPushButton
Width	The length of the horizontal side of the TextPushButton

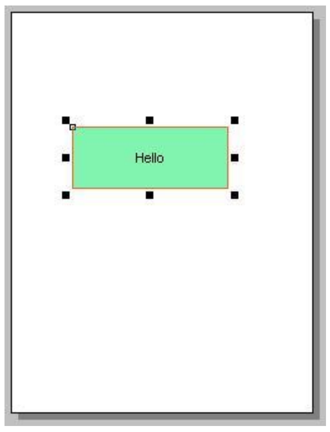
Changing FillColor, OutlineColor, and PressFillColor

Click the “FillColor” field in the **Inspector**. Then click the “…” button to open the color window to select a color. Repeat the same procedure for “OutlineColor” and “PressFillColor”.



FillColor	0x0080FF
Font	(Font)
Height	63
ID	9
Left	38
Name	TextPushButton
OnClick	
OutlineColor	0x808040
PressFillColor	0x0000FF
Reference	
RefObject	
Text	Hello
Top	215
Width	168

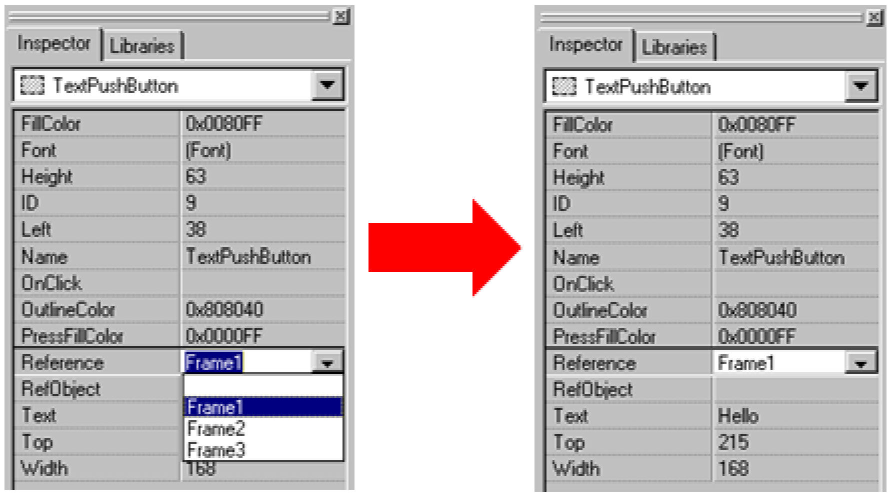
For example, set FillColor to green and OutlineColor to red and then you may have the results as shown below.



Using Reference to another frame

The Reference property is used as an event of go-to-specified-frame. **It has higher priority than other events, such as OnClick event.** Thus specifying an option of the Reference property disables the OnClick event.

It's easy to specify a value to the Reference property. Simply click the "Reference" field in the **Inspector** and then choose the frame for reference.

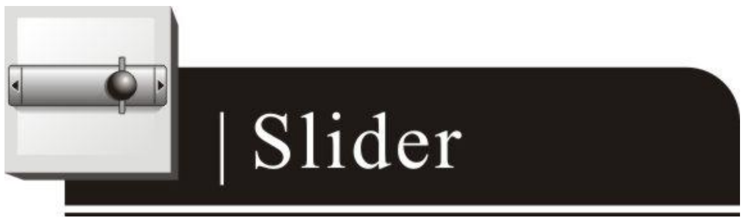


FillColor	0x0080FF
Font	(Font)
Height	63
ID	9
Left	38
Name	TextPushButton
OnClick	
OutlineColor	0x808040
PressFillColor	0x0000FF
Reference	Frame1
RefObject	
Text	
Top	
Width	168

FillColor	0x0080FF
Font	(Font)
Height	63
ID	9
Left	38
Name	TextPushButton
OnClick	
OutlineColor	0x808040
PressFillColor	0x0000FF
Reference	Frame1
RefObject	
Text	Hello
Top	215
Width	168

5.4.8. Using a Slider

This section shows how to use a Slider.

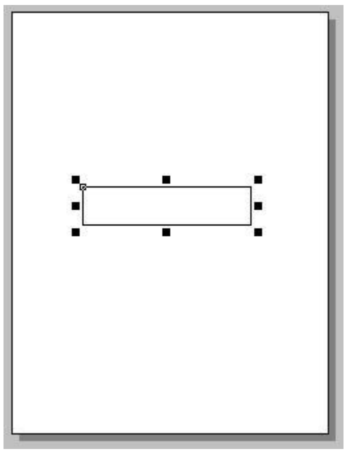


What is a Slider?

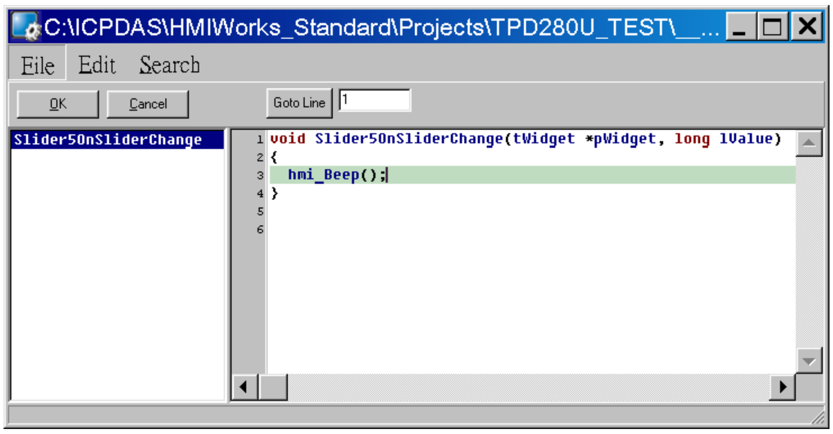
A Slider is a control element used to set levels. Usually, a Slider is used in volume control.

Using a Slider:

1. Click the Slider icon from the Widget panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized Slider.



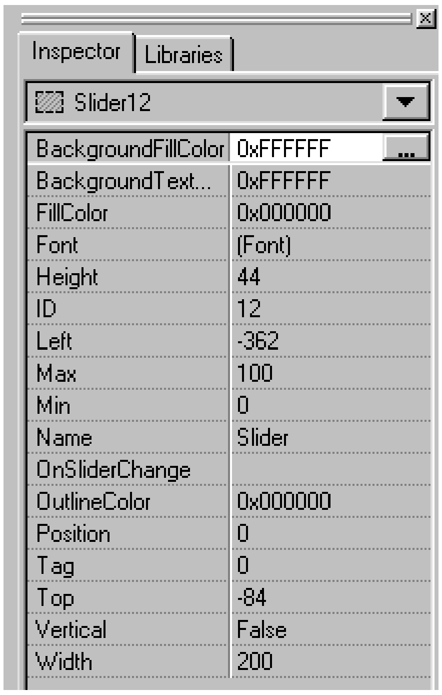
3. Double click the Slider component on the frame design area to open the programming window. Write the OnSliderChange event handler in it. Here we use hmi_Beep() to sound a beep for example.
Note: The property "OnSliderChange" is supported only in programming type "Standard C".



```
void Slider5OnSliderChange(tWidget *pWidget, long lValue)
{
  hmi_Beep();
}
```

4. Press **OK** to save the file and leave.

Properties of Slider



Inspector | Libraries

Slider12

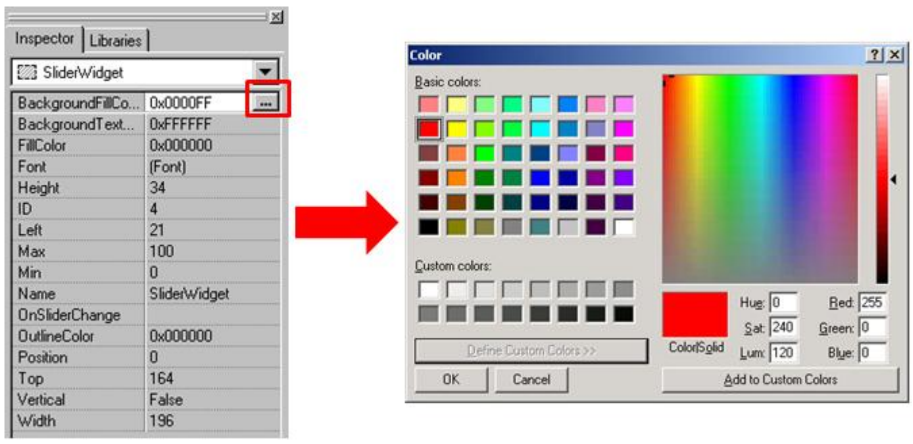
BackgroundFillColor	0xFFFFFF
BackgroundText...	0xFFFFFF
FillColor	0x000000
Font	(Font)
Height	44
ID	12
Left	-362
Max	100
Min	0
Name	Slider
OnSliderChange	
OutlineColor	0x000000
Position	0
Tag	0
Top	-84
Vertical	False
Width	200

properties	description
BackgroundFillColor	The color used to fill the background of the Slider. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
BackgroundTextColor	The color of the text in the background of the Slider. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
FillColor	The color used to fill the Slider. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
Font	The font of the text on the Slider
Height	The length of the vertical side of the Slider
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers

	are used to identify them.
Left	The x-coordinate of the left-top vertex of the Slider
Max	The maximum value of the Position
Min	The minimum value of the Position
Name	The name of the Slider
OnSliderChange	The function name of the on-slider-change event handler of the Slider. **Note**: The property is supported only in programming type “Standard C”.
OutlineColor	The outline color of the Slider
Position	The value where the slider locate (between Max and Min)
Tag	The variable used for programming purpose. For example, it can be assigned a unique number for each Slider component in order to identify them. Refer to the <<API Reference>> for functions to get/set the Tag property. **Note**: This Tag has nothing to do with the “Tag” which the TagName property refers to.
TagName	Associate a variable (tag) in **Ladder Designer**. **Note**: The property is supported only in programming type “Ladder”.
Top	The y-coordinate of the left-top vertex of the Slider
Vertical	The direction of the Slider
Width	The length of the horizontal side of the Slider

Changing FillColor and OutlineColor

Click the “FillColor” field in the **Inspector**. Then click the “…” button to open the color window to select a color. Repeat the same procedure for “OutlineColor”, “BackgroundFillColor” and “BackgroundTextColor”.

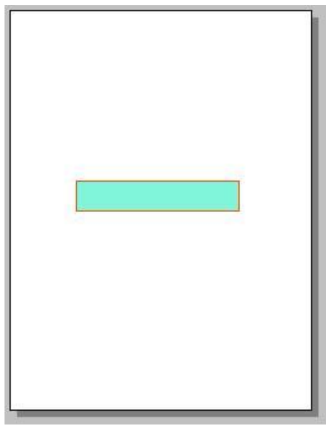


Inspector | Libraries

SliderWidget

BackgroundFillCo...	0x0000FF
BackgroundText...	0xFFFFFF
FillColor	0x000000
Font	(Font)
Height	34
ID	4
Left	21
Max	100
Min	0
Name	SliderWidget
OnSliderChange	
OutlineColor	0x000000
Position	0
Top	164
Vertical	False
Width	196

For example, set FillColor to green and OutlineColor to red and then you may have the results as shown below.



5.4.9. Using a BitButton

This section shows how to use a BitButton.

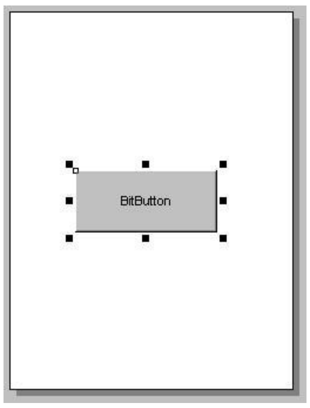
What is a BitButton?

A BitButton is a button with 3D appearance and the status rebounds back if releasing the pressed button. When you press it, you can see that the

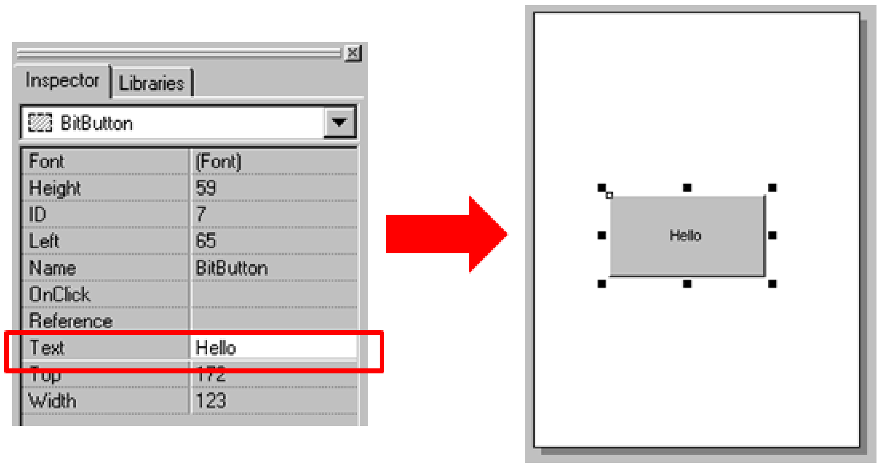
BitButton is pressed “down”. This 3D-like appearance is achieved by two images so that it takes more spaces to store and more time to download than a Text PushButton.

Using a BitButton:

1. Click the BitButton icon from the Widget panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized BitButton.

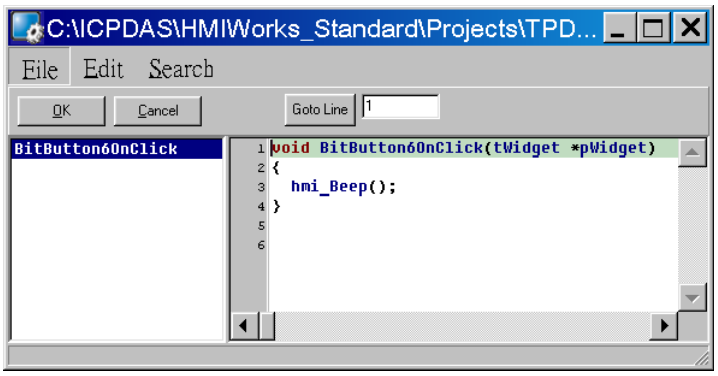


3. Click the “Text” field in the **Inspector** to change the string on the BitButton. Here we change the Text to “Hello”.



Font	(Font)
Height	59
ID	7
Left	65
Name	BitButton
OnClick	
Reference	
Text	Hello
Top	172
Width	123

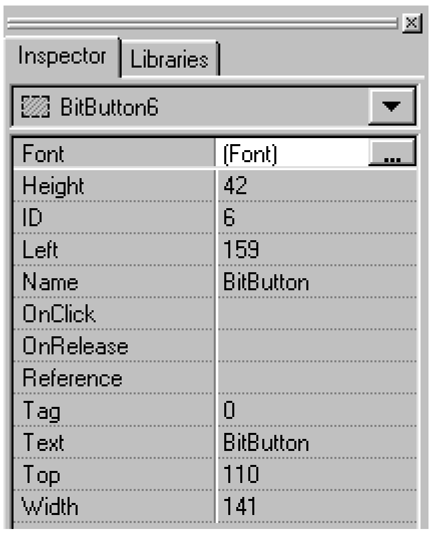
4. Double click the BitButton on the frame design area to open the programming window. Write the On-Click event handler in it. Here we use hmi_Beep() to sound a beep for example.
Note: The property “OnClick” is supported only in programming type “Standard C”.



```
void BitButton6OnClick(tWidget *pWidget)
{
  hmi_Beep();
}
```

5. Press **OK** to save the file and leave.

Properties of BitButton



Font	(Font)
Height	42
ID	6
Left	159
Name	BitButton
OnClick	
OnRelease	
Reference	
Tag	0
Text	BitButton
Top	110
Width	141

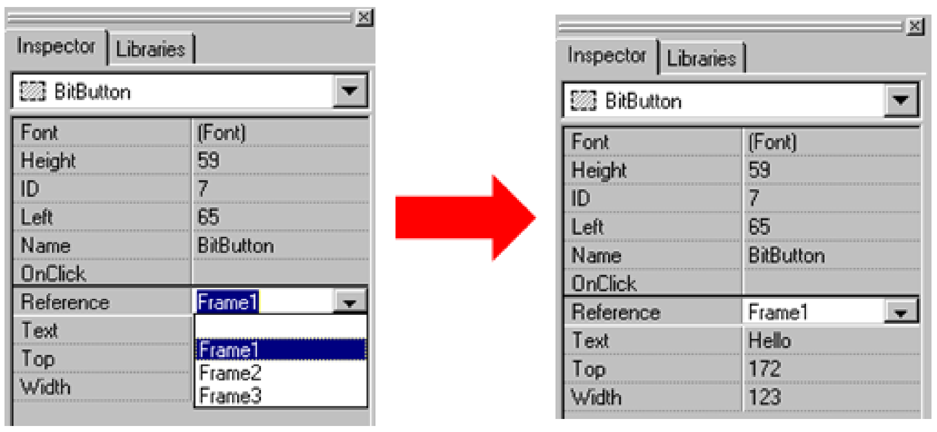
properties	description
Font	The font of the text of the BitButton
Height	The length of the vertical side of the BitButton
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the BitButton
Name	The name of the BitButton
OnClick	The function name of the on-click event handler of the BitButton. **Note**: Supported only in programming type "Standard C".
OnRelease	The function name of the on-release event handler of the BitButton. **Note**: Supported only in programming type "Standard C".

Reference	The reference to a frame. That is, when pressing on the BitButton, TouchPAD goes to the frame you specified in this property. **Note**: The **priority** of the property "Reference" is higher than that of "OnClick".
Tag	The variable used for programming purpose. For example, it can be assigned a unique number for each BitButton component in order to identify them. Refer to the <<API Reference>> for functions to get/set the Tag property. **Note**: This Tag has nothing to do with the "Tag" which the TagName property refers to.
TagName	Associate a variable (tag) in **Ladder Designer**. **Note**: The property is supported only in programming type "Ladder".
Text	The string on the BitButton
Top	The y-coordinate of the left-top vertex of the BitButton
Width	The length of the horizontal side of the BitButton

Using Reference to another frame

The Reference property is used as an event of go-to-specified-frame. **It has higher priority than other events, such as OnClick event.** Thus specifying a value to the Reference property disables the OnClick event handler.

It's easy to specify an option to the Reference property. Simply click the "Reference" field in the **Inspector** and then choose the frame for reference.



Font	(Font)
Height	59
ID	7
Left	65
Name	BitButton
OnClick	
Reference	Frame1
Text	Frame1 Frame2 Frame3
Top	
Width	

Font	(Font)
Height	59
ID	7
Left	65
Name	BitButton
OnClick	
Reference	Frame1
Text	Hello
Top	172
Width	123

5.4.10. Using a HotSpot

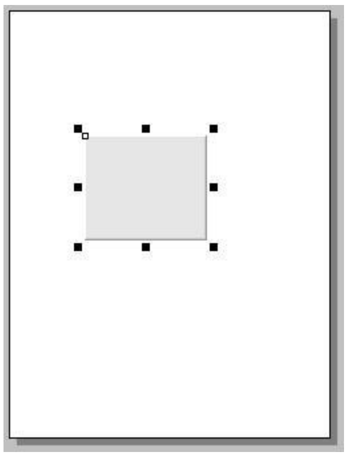
This section shows how to use a HotSpot.

What is a HotSpot?

HotSpot decides an area which is capable of responding to on-click events. Usually, putting a HotSpot on the Drawing components (that is, Rectangles, Ellipses, Texts, Pictures, and Lines) makes them to respond to on-click events. After downloading to TouchPAD, a HotSpot is invisible.

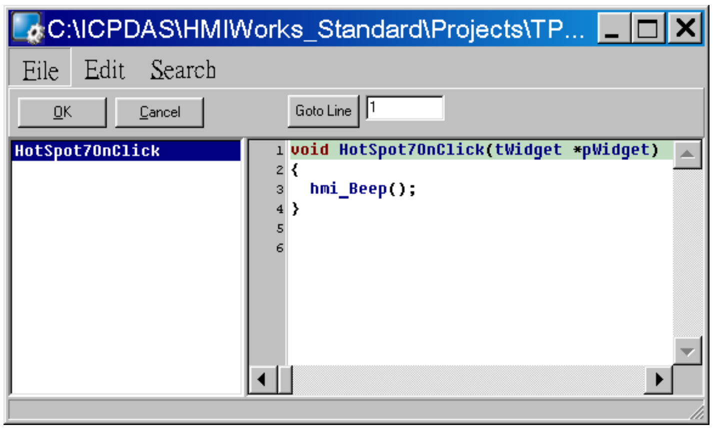
Using a HotSpot:

1. Click the HotSpot icon from the Widget panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized HotSpot.



3. Double click the HotSpot on the frame design area to open the programming window. Write the On-Click event handler in it. Here we use hmi_Beep() to sound a beep for example.

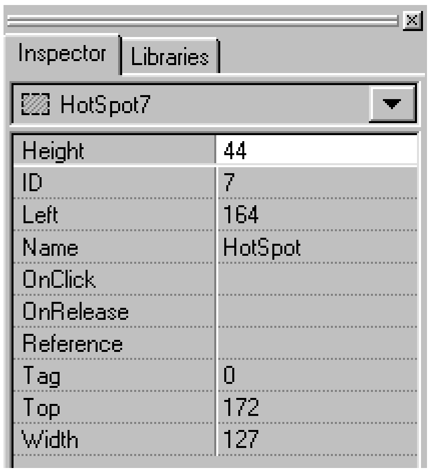
Note: The property "OnClick" is supported only in programming type "Standard C".



```
void HotSpot7OnClick(tWidget *pWidget)
{
  hmi_Beep();
}
```

4. Press **OK** to save the file and leave.

Properties of HotSpot



Height	44
ID	7
Left	164
Name	HotSpot
OnClick	
OnRelease	
Reference	
Tag	0
Top	172
Width	127

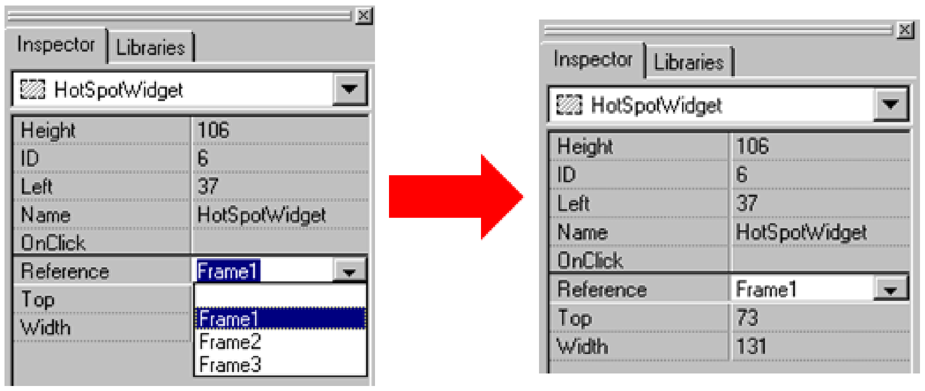
properties	description
Height	The length of the vertical side of the HotSpot
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the HotSpot
Name	The name of the HotSpot
OnClick	The function name of the on-click event handler of the HotSpot. **Note**: Supported only in programming type "Standard C".
OnRelease	The function name of the on-release event handler of the HotSpot.

	Note: Supported only in programming type “Standard C”.
Reference	The reference to a frame. That is, when pressing on the HotSpot, TouchPAD goes to the frame you specified in this property. **Note**: The **priority** of the property “Reference” is higher than that of “OnClick”.
Tag	The variable used for programming purpose. For example, it can be assigned a unique number for each HotSpot component in order to identify them. Refer to the <<API Reference>> for functions to get/set the Tag property. **Note**: This Tag has nothing to do with the “Tag” which the TagName property refers to.
TagName	Associate a variable (tag) in **Ladder Designer**. **Note**: The property is supported only in programming type “Ladder”.
Top	The y-coordinate of the left-top vertex of the HotSpot
Width	The length of the horizontal side of the HotSpot

Using Reference to another frame

The Reference property is used as an event of go-to-specified-frame. **It has higher priority than other events, such as OnClick event.** Thus specifying a value to the Reference property disables the OnClick event.

It’s easy to specify an option to the Reference property. Simply click the “Reference” field in the **Inspector** and then choose the frame for reference.



Height	106
ID	6
Left	37
Name	HotSpotWidget
OnClick	
Reference	Frame1
Top	73
Width	131

5.4.11. Using a CheckBox

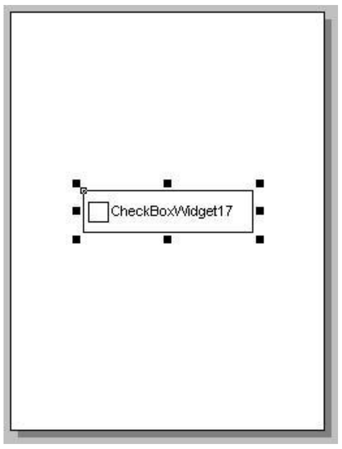
This section shows how to use a CheckBox.

What is a CheckBox?

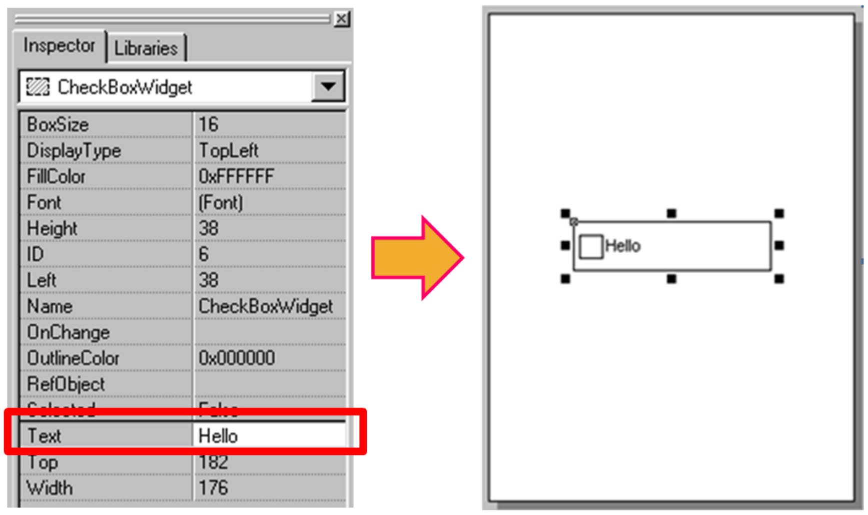
A CheckBox is a control element that provides a yes-no choice.

Using a CheckBox:

1. Click the CheckBox icon from the Widget panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized CheckBox.

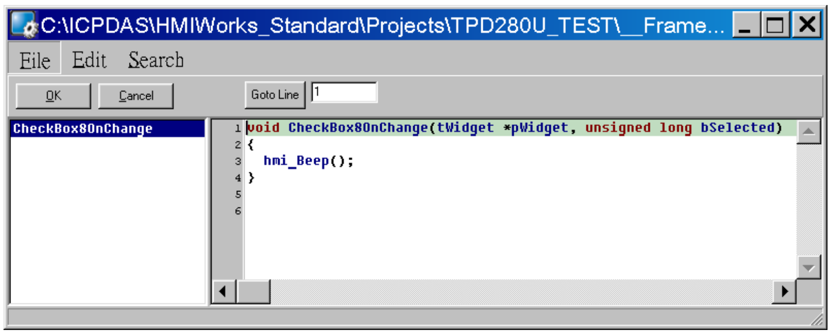


3. Click on the “Text” field in the **Inspector** to change the string on the CheckBox. Here we change the Text to “Hello”.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	38
ID	6
Left	38
Name	CheckBoxWidget
OnChange	
OutlineColor	0x000000
RefObject	
Selected	False
Text	Hello
Top	182
Width	176

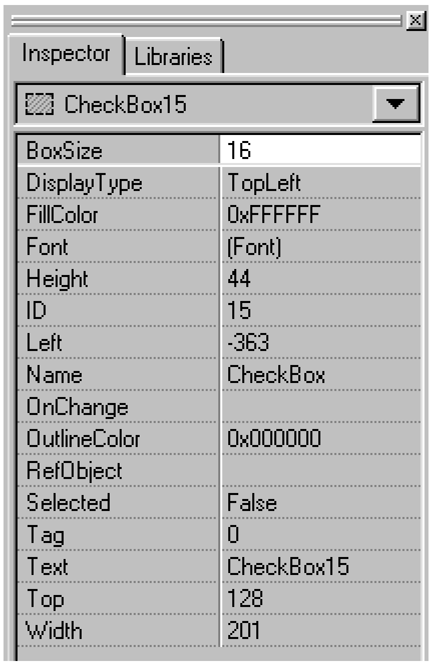
4. Double click the CheckBox on the frame design area to open the programming window. Write the OnChange event handler in it. Here we use hmi_Beep() to sound a beep for example.
   Note: The property “OnChange” is supported only in programming type “Standard C”.


C:\ICPDAS\HMIWorks_Standard\Projects\TPD280U_TEST\__Frame...
File
Edit
Search
OK
Cancel
Goto Line
1
CheckBox80nChange

```
void CheckBox80nChange(tWidget *pWidget, unsigned long bSelected)
{
  hmi_Beep();
}
```

5. Press **OK** to save the file and leave.

Properties of CheckBox


Inspector | Libraries

CheckBox15

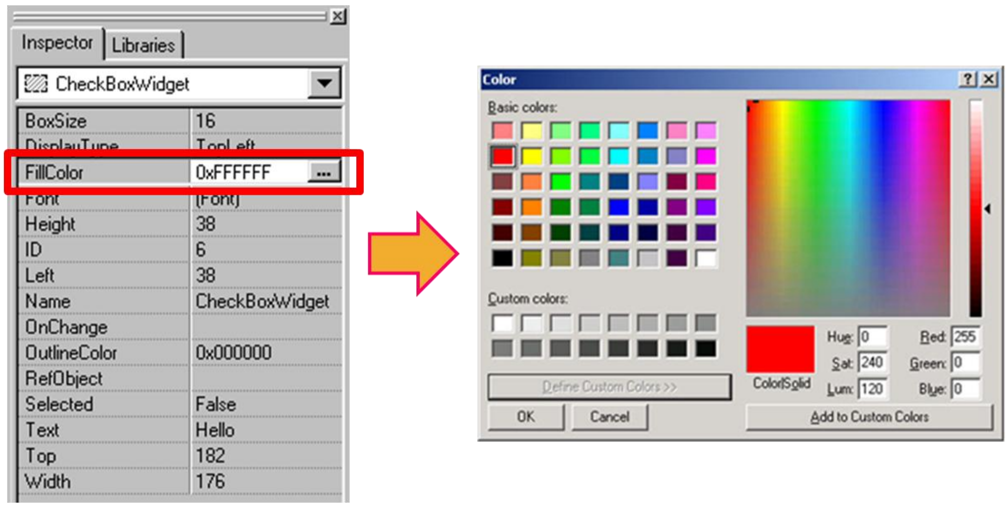
BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	44
ID	15
Left	-363
Name	CheckBox
OnChange	
OutlineColor	0x000000
RefObject	
Selected	False
Tag	0
Text	CheckBox15
Top	128
Width	201

properties	description
BoxSize	The size of the checking box
DisplayType	How to display the pictures which are loaded from RefObject property.
FillColor	The color used to fill the CheckBox. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
Font	The font of the text of the CheckBox
Height	The length of the vertical side of the CheckBox
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the CheckBox
Name	The name of the CheckBox
OnChange	The function name of the OnChange event handler of the CheckBox.
OutlineColor	The outline color of the CheckBox
RefObject	The reference to the object list. An object list is a component that can be selected in the **Toolbox** to maintain a list of the elements of the library. Refer to section "Using an ObjectList" for details.
Selected	True or false. Whether the CheckBox is checked or not
Tag	The variable used for programming purpose. For

	example, it can be assigned a unique number for each CheckBox component in order to identify them. Refer to the <<API Reference>> for functions to get/set the Tag property. **Note**: This Tag has nothing to do with the “Tag” which the TagName property refers to.
TagName	Associate a variable (tag) in **Ladder Designer**. **Note**: the property is supported only in programming type “Ladder”.
Text	The string of the CheckBox
Top	The y-coordinate of the left-top vertex of the CheckBox
Width	The length of the horizontal side of the CheckBox

Changing FillColor and OutlineColor

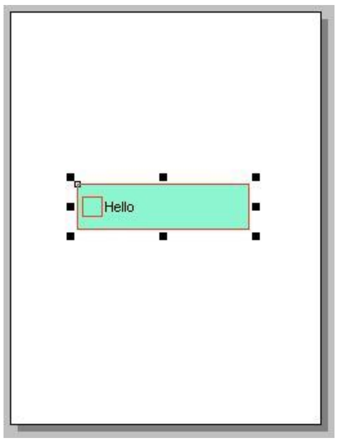
Click the “FillColor” field in the **Inspector**. Then click the “…” button to open the color window to select a color. Repeat the same procedure for “OutlineColor”.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	38
ID	6
Left	38
Name	CheckBoxWidget
OnChange	
OutlineColor	0x000000
RefObject	
Selected	False
Text	Hello
Top	182
Width	176

Hue: 0 Sat: 240 Lum: 120 Red: 255 Green: 0 Blue: 0

For example, set FillColor to green and OutlineColor to red and then you may have the results as shown below.



5.4.12. Using a Label

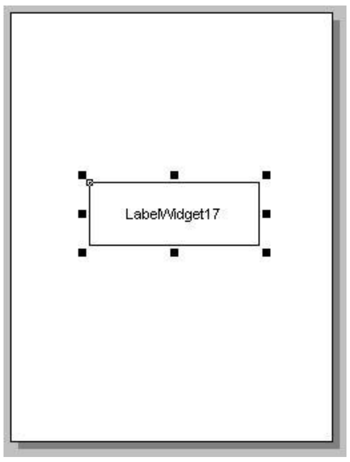
This section shows how to use a Label.

What is a Label?

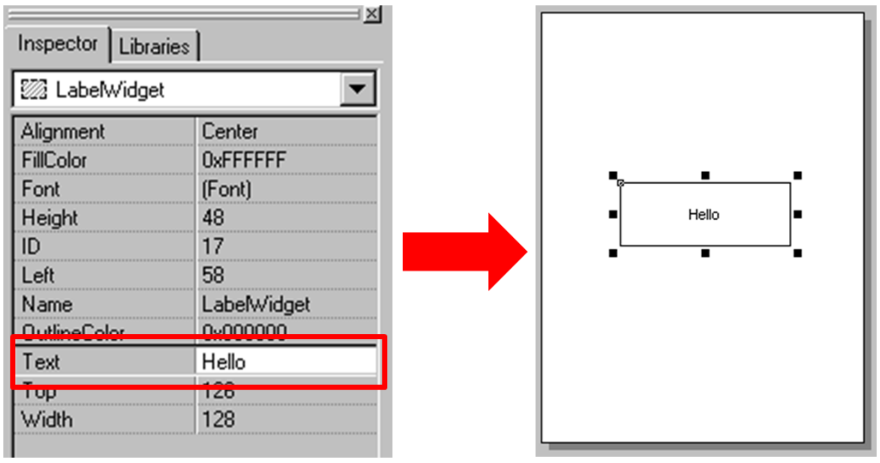
A Label is a Text put on TouchPAD to give information that may change at the run time.

Using a Label:

1. Click the Label icon from the Widget panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized Label.

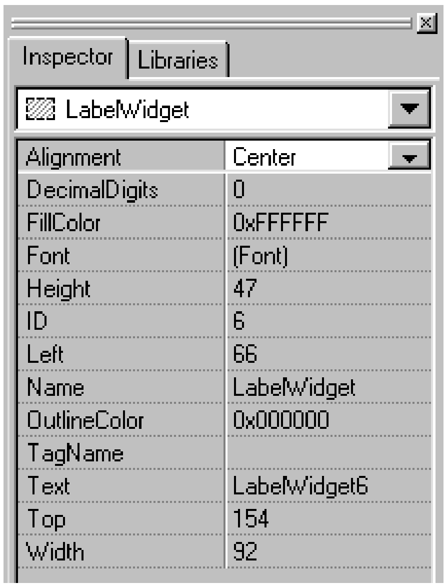


3. Click the “Text” field in the **Inspector** to change the string on the Label. Here we change the Text to “Hello”.



Alignment	Center
FillColor	0xFFFFFF
Font	(Font)
Height	48
ID	17
Left	58
Name	LabelWidget
OutlineColor	0x000000
Text	Hello
Top	128
Width	128

Properties of Label



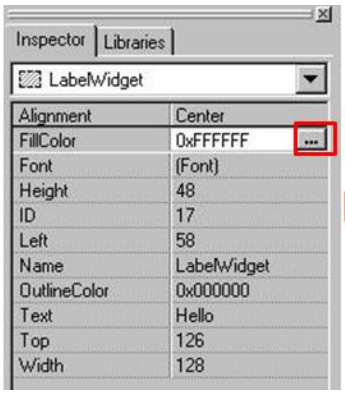
Alignment	Center
DecimalDigits	0
FillColor	0xFFFFFF
Font	(Font)
Height	47
ID	6
Left	66
Name	LabelWidget
OutlineColor	0x000000
TagName	
Text	LabelWidget6
Top	154
Width	92

properties	description
Alignment	This property determines where to locate the string, left, right, or center. (LeftJustify, RightJustify, or Center)
DecimalDigits	The power to which ten must be raised to produce the value, say divisor, which is used to divide the value of the associated tag of this Label. The value of the tag must be divided by the divisor to show on the screen to represent decimal digits. **Note**: The property is supported only in programming type “Ladder”.
FillColor	The color used to fill the Label. The color is represented by a three byte value in the hexadecimal form. From the highest byte to the lowest, it is the blue byte, the green byte, the red byte in sequence.
Font	The font of the text
Height	The length of the vertical side of the Label
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the Label
Name	The name of the Label
OutlineColor	The outline color of the Label
TagName	Associate a variable (tag) in **Ladder Designer**. **Note**: The property is supported only in programming type “Ladder”.

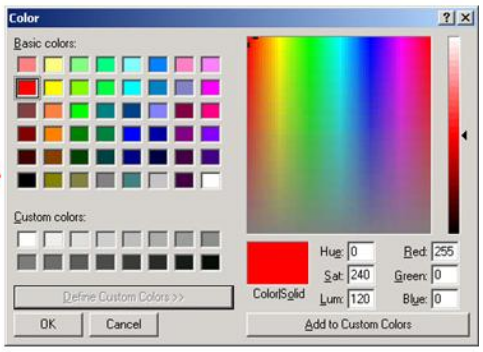
Text	The string of the Label
Top	The y-coordinate of the left-top vertex of the Label
Width	The length of the horizontal side of the Label

Changing FillColor and OutlineColor

Click the “FillColor” field in the **Inspector**. Then click the “…” button to open the color window to select a color. Repeat the same procedure for “OutlineColor”.

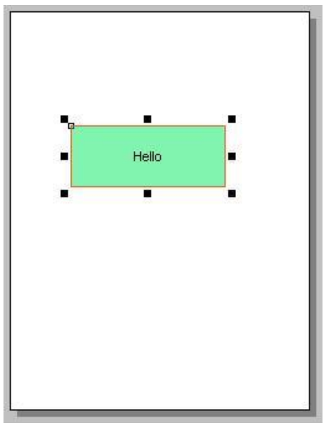


Alignment	Center
FillColor	0xFFFFFF
Font	(Font)
Height	48
ID	17
Left	58
Name	LabelWidget
OutlineColor	0x000000
Text	Hello
Top	126
Width	128



Hue: 0 Sat: 240 Lum: 120
Red: 255 Green: 0 Blue: 0

For example, set FillColor to green and OutlineColor to red and then you may have the results as shown below.



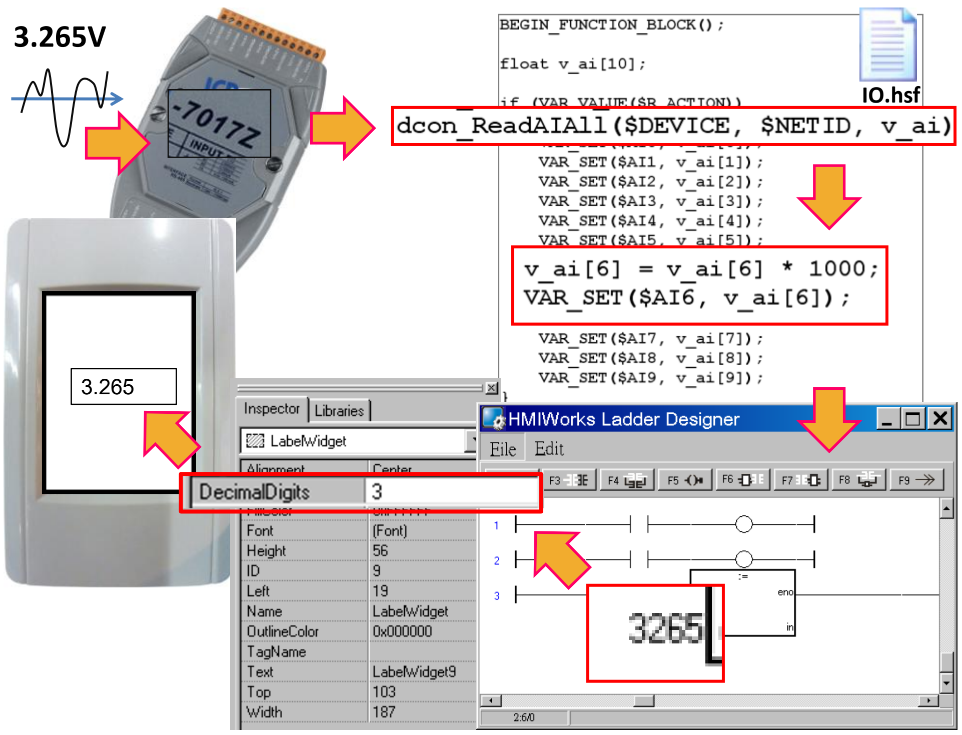
Representing decimals for Ladder Designer

The numbers used in the **Ladder Desinger** are all integers. The decimals are not accepted in the **Ladder Designer**. However, in some cases, users may need to calculate or display decimals. So we provide a work-around method to handle these cases.

Take the I-7017Z module for example. Supposed that we use the I-7017Z module to read an analog value 3.265V back from the remote side and we want to display decimals on the TouchPAD devices. But the **Ladder Designer** supports only integers. So we must handle this drawback to directly read back the AI value from the I-7017Z module in the **Ladder Designer**.

1. Set the property "DecimalDigits" to the number of digits in the right of the decimal point. For example, we set DecimalDigits to 3.
2. Modify the I/O module's IO.hsf. Let the read back AI value multiplied by ten of the n-th power where n is the value of "DecimalDigits". You can find out I/O module's IO.hsf file in the following locations: "[HMIWorks_install_path]\ bin\Modules\".
   For example, IO.hsf of I-7017Z is located in "C:\ICPDAS\HMIWorks_Standard\bin\Modules\I-7000\I-7017Z", where "C:\ICPDAS\HMIWorks_Standard\" is the installation path of HMIWorks. And we modify the IO.hsf to make v_ai[6] = v_ai[6] * 1000; Supposed we use channel 6 to read back AI value.

As shown in the figure below, you can see that the tag "$AI6" in the **Ladder Designer** is 1000 times of the real value. With DecimalDigits set to 3, the correct value 3.265 is displayed on TouchPAD.



```
BEGIN_FUNCTION_BLOCK();

float v_ai[10];

if (VAR_VALUE($R_ACTION))
dcon_ReadAIAll($DEVICE, $NETID, v_ai)
    VAR_SET($AI1, v_ai[1]);
    VAR_SET($AI2, v_ai[2]);
    VAR_SET($AI3, v_ai[3]);
    VAR_SET($AI4, v_ai[4]);
    VAR_SET($AI5, v_ai[5]);
  v_ai[6] = v_ai[6] * 1000;
  VAR_SET($AI6, v_ai[6]);
    VAR_SET($AI7, v_ai[7]);
    VAR_SET($AI8, v_ai[8]);
    VAR_SET($AI9, v_ai[9]);
}
```

Alignment	Center
DecimalDigits	3
Font	(Font)
Height	56
ID	9
Left	19
Name	LabelWidget
OutlineColor	0x000000
TagName	
Text	LabelWidget9
Top	103
Width	187

Representing decimals in the C language

In the frame of “Standard C”, representing decimals may be difficult since “sprintf” function is not supported in HMIWorks.

We use “usprintf” (or “usnprintf”) to replace “sprintf”, but “usprintf” does not support the argument “%f”. In order to display a floating-point value, we provide a new API function for this purpose, the “FloatToStr” function as shown in the example below.

```
void TextPushButton4OnClick(tWidget *pWidget)
{
   float ret_sin;
   float angle = 1.57;
   static char str_sin[16];

   // sin
   ret_sin = sin(angle);

   // int FloatToStr(char *buf, float fVal, int precision);
   // the precision determine the number of the digits after the decimal point
   FloatToStr(str_sin, ret_sin, 3);
   LabelTextSet(&Label5, str_sin);    // The result is 1.000
}
```

5.4.13. Using a Timer

This section shows how to use a Timer.

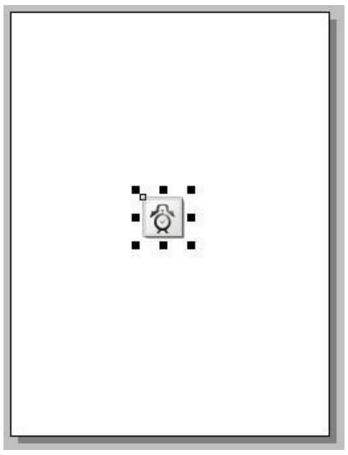
Note: this component is supported only in programming type “Standard C”.

What is a Timer?

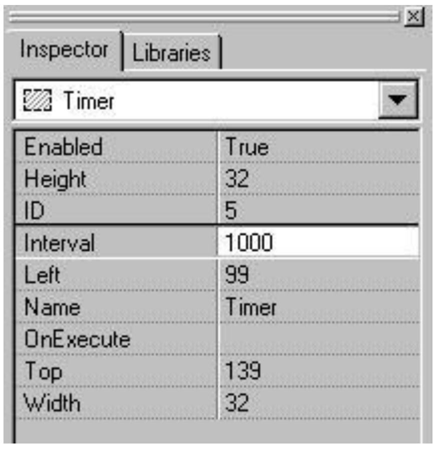
A Timer is a component that executes the OnExecute event handler every specified interval.

Using a Timer:

1. Click the Timer icon from the System panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click to put the Timer on it.
3. Note that you should not worry about the size or the location of the Timer because the Timer is invisible when downloaded to the TouchPAD. Also it’s not necessary to put the Timer on the frame panel.

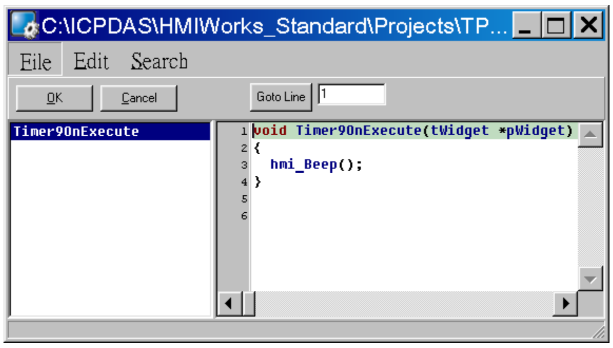


4. Click the “Interval” field in the **Inspector** to change the repeating period of the Timer. Here we set the Interval to 1000 (ms). And then change the property “Enabled” to True.



Enabled	True
Height	32
ID	5
Interval	1000
Left	99
Name	Timer
OnExecute	
Top	139
Width	32

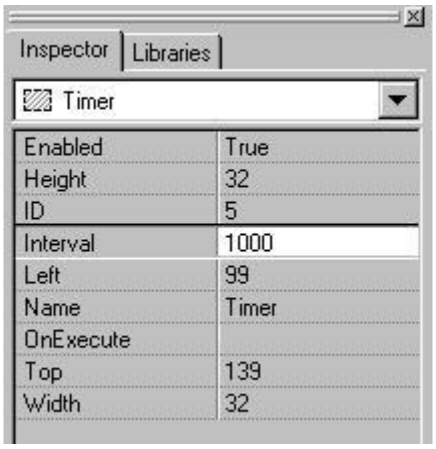
5. Double click the Timer on the frame design area to open the programming window. Write the OnExecute event handler in it. Here we use hmi_Beep() to sound a beep for example.



```
void Timer9OnExecute(tWidget *pWidget)
{
  hmi_Beep();
}
```

6. Press **OK** to save the file and leave.

Properties of Timer



Enabled	True
Height	32
ID	5
Interval	1000
Left	99
Name	Timer
OnExecute	
Top	139
Width	32

properties	description
Enabled	Whether the Timer is enabled or not
Height	The length of the vertical side of the Timer (This property cannot be changed by users.)
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Interval	The time span of two consecutive OnExecute events
Left	The x-coordinate of the left-top vertex of the Timer

Name	The name of the Timer
OnExecute	The function name of the OnExecute event handler of the Timer.
Top	The y-coordinate of the left-top vertex of the Timer
Width	The length of the horizontal side of the Timer (cannot be changed by users.)

5.4.14. Using a PaintBox

This section shows how to use a PaintBox.

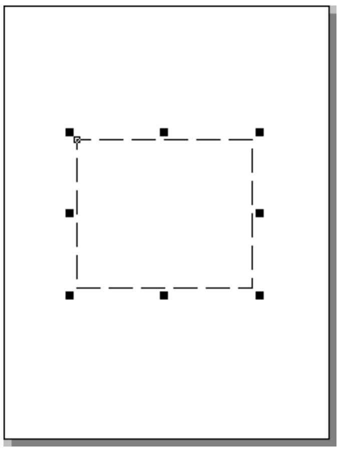
Note: this tool is supported only in programming type “Standard C”.

What is a PaintBox?

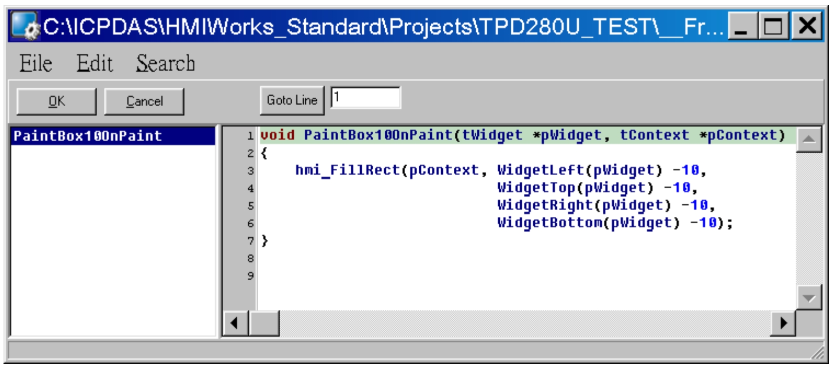
A PaintBox is a component which is used to paint shapes, such as rectangles, ellipses, etc., in the runtime.

Using a PaintBox

1. Click the PaintBox icon from the System panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click and drag a suitable sized PaintBox.



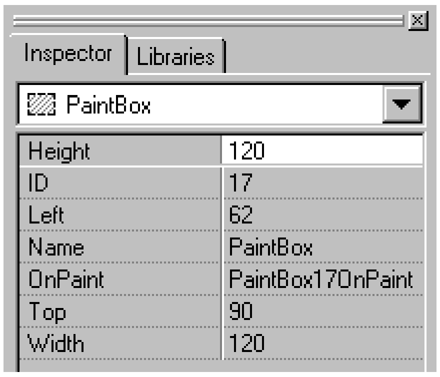
3. Double click the PaintBox on the frame design area to open the programming window. Write the OnPaint event handler in it. Here we draw a rectangle for example.
   Note 1: the diagonal points used in the function of hmi_FillRect are in **the same** coordinate as the frame.
   Note 2: the part of the rectangle which is outside the perimeter of the PaintBox is cut off.
   Note 3: WidgetLeft(pWidget) and WidgetTop(pWidget) are the x, y coordinates of the left-top vertex of the PaintBox. While WidgetRight(pWidget) and WidgetBottom(pWidget) are those of the right-bottom.



```
void PaintBox10OnPaint(tWidget *pWidget, tContext *pContext)
{
    hmi_FillRect(pContext, WidgetLeft(pWidget) -10,
                           WidgetTop(pWidget) -10,
                           WidgetRight(pWidget) -10,
                           WidgetBottom(pWidget) -10);
}
```

4. Press **OK** to save the file and leave.

Properties of PaintBox

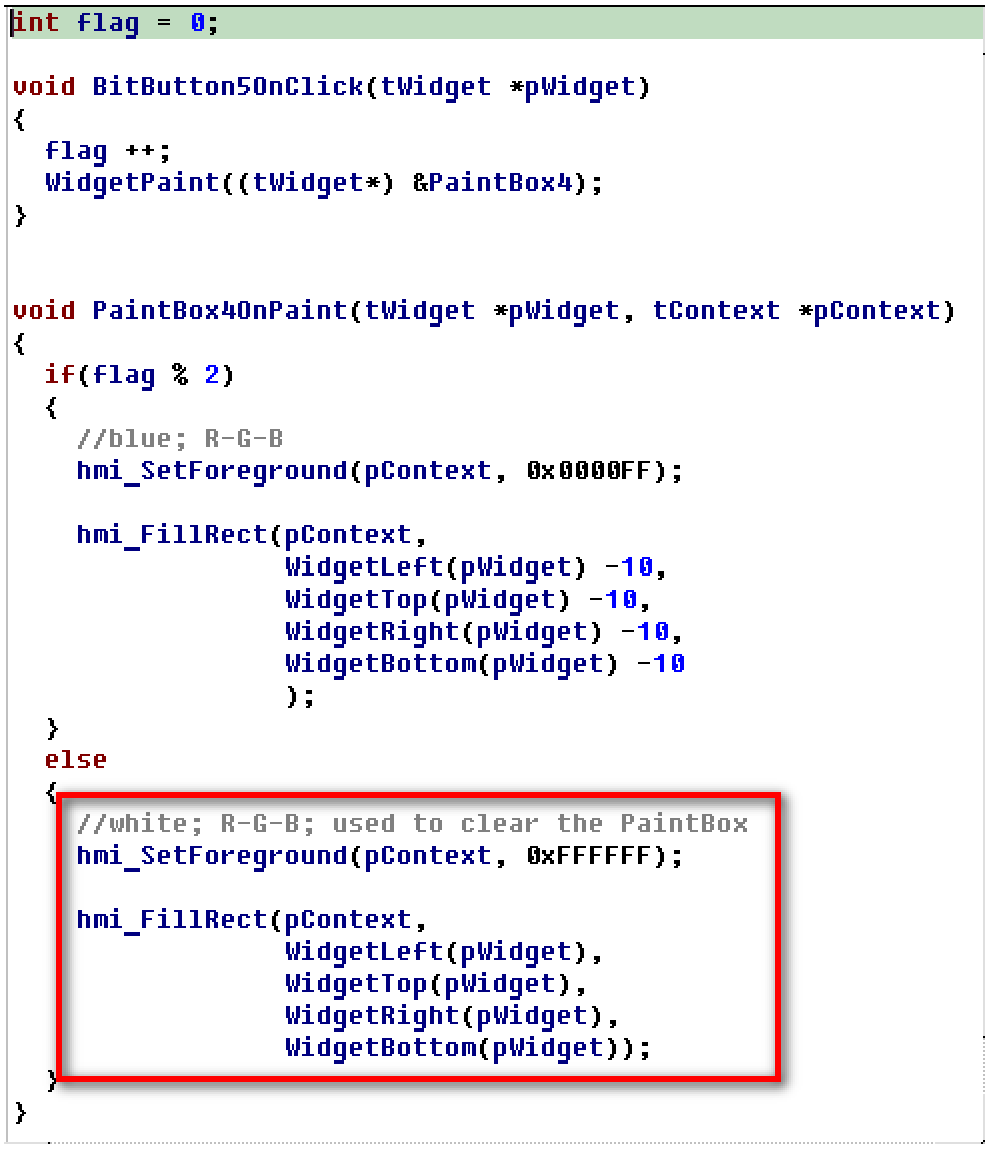


Height	120
ID	17
Left	62
Name	PaintBox
OnPaint	PaintBox17OnPaint
Top	90
Width	120

properties	description
Height	The length of the vertical side of the PaintBox
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the PaintBox
Name	The name of the PaintBox
OnPaint	The function name of the OnPaint event of the PaintBox.
Top	The y-coordinate of the left-top vertex of the PaintBox
Width	The length of the horizontal side of the PaintBox

Clearing a PaintBox

Use the “hmi_SetForeground” function to paint a white rectangle to clear the PaintBox as shown in the red box in the example below.
Refer to the API reference for more details.
ftp://ftp.icpdas.com/pub/cd/touchpad/document/english/api_reference/



```
int flag = 0;

void BitButton5OnClick(tWidget *pWidget)
{
  flag ++;
  WidgetPaint((tWidget*) &PaintBox4);
}


void PaintBox4OnPaint(tWidget *pWidget, tContext *pContext)
{
  if(flag % 2)
  {
    //blue; R-G-B
    hmi_SetForeground(pContext, 0x0000FF);

    hmi_FillRect(pContext,
                 WidgetLeft(pWidget) -10,
                 WidgetTop(pWidget) -10,
                 WidgetRight(pWidget) -10,
                 WidgetBottom(pWidget) -10
                 );
  }
  else
  {
    //white; R-G-B; used to clear the PaintBox
    hmi_SetForeground(pContext, 0xFFFFFF);

    hmi_FillRect(pContext,
                 WidgetLeft(pWidget),
                 WidgetTop(pWidget),
                 WidgetRight(pWidget),
                 WidgetBottom(pWidget));
  }
}
```

5.4.15. Using an ObjectList

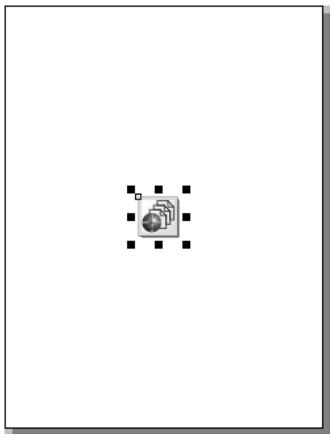
This section shows how to use an ObjectList component.

What is an ObjectList?

An ObjectList is a component which is used to maintain a list of library objects. An ObjectList can be used in both programming types. Combined with “RefObject” properties of the TextPushButton and the CheckBox components, users can easily toggle two images.

Using an ObjectList:

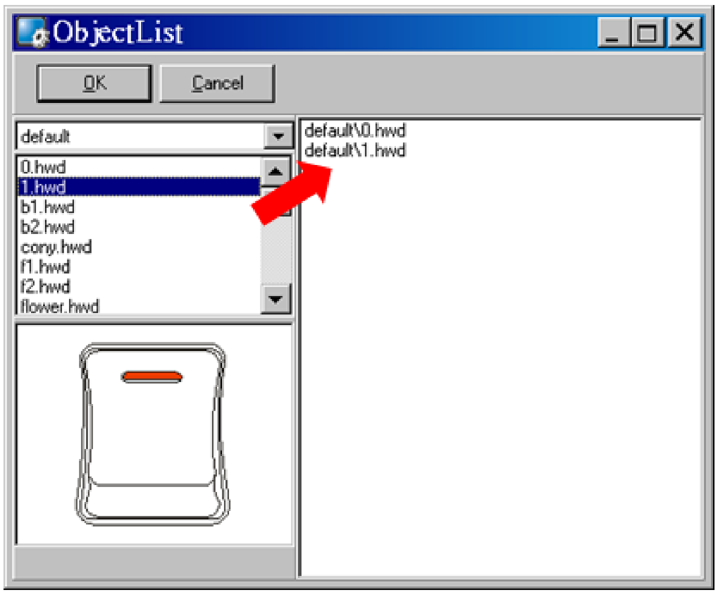
1. Click the ObjectList icon from the System panel of the **Toolbox** tab.
2. Move your mouse to the frame design area and click to put an ObjectList component on it.
3. Note that you should not worry about the size or the location of the ObjectList component because the ObjectList component is invisible when downloaded to the TouchPAD device. Also it’s not necessary to put the ObjectList component on the frame panel.



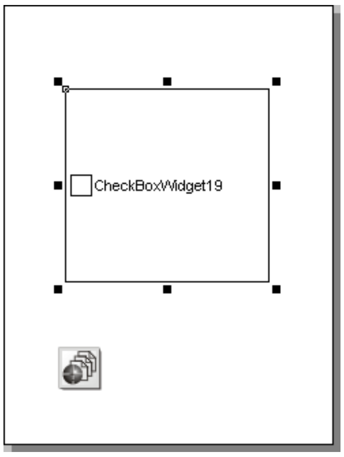
4. The ObjectList component maintains a list of a library objects and is used in a TextPushButton component or a CheckBox component. After downloading to the TouchPAD device, the images of the library objects replace the TextPushButton component or the CheckBox component. When the state of the TextPushButton component or the CheckBox component changed, users see only the images of the library objects toggles but do not see the original appearances of the TextPushButton component or the CheckBox component.

5. Add two library objects in the ObjectList by double clicking the ObjectList icon. Then the “ObjectList” window is displayed. Double click on the list of the library objects to adds them to the right side region.
   Note 1: To delete the library objects in the “ObjectList” window,

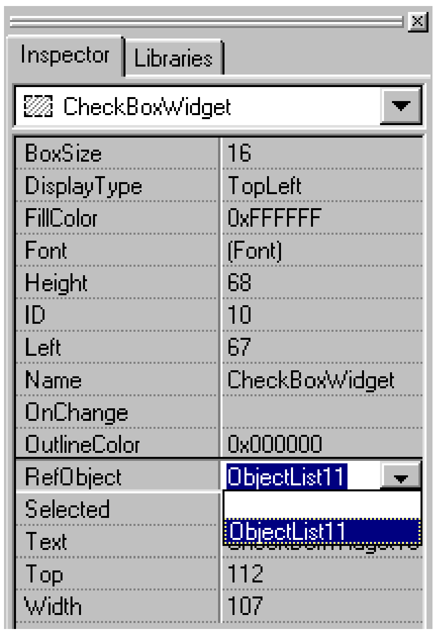
double click on the objects in the right-side block.



6. Click and drag a CheckBox component on the frame panel for example. Be sure to make the size of the CheckBox component large enough to cover the whole image of the library object.



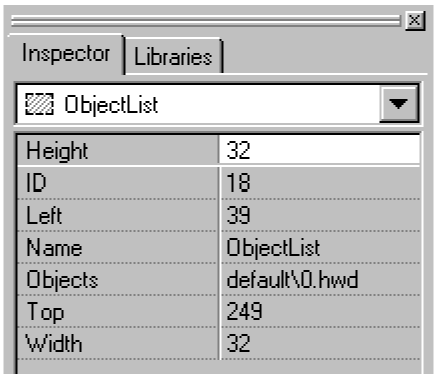
7. Go to the **Inspector** to select an option from the "RefObject" field for the CheckBox component. The selected ObjectList component is connected to the CheckBox component.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	68
ID	10
Left	67
Name	CheckBoxWidget
OnChange	
OutlineColor	0x000000
RefObject	ObjectList11
Selected	
Text	ObjectList11
Top	112
Width	107

8. Build and download the project. You can see two images of the library objects toggle when the state of the TextPushButton component or the CheckBox component changes.

Properties of ObjectList

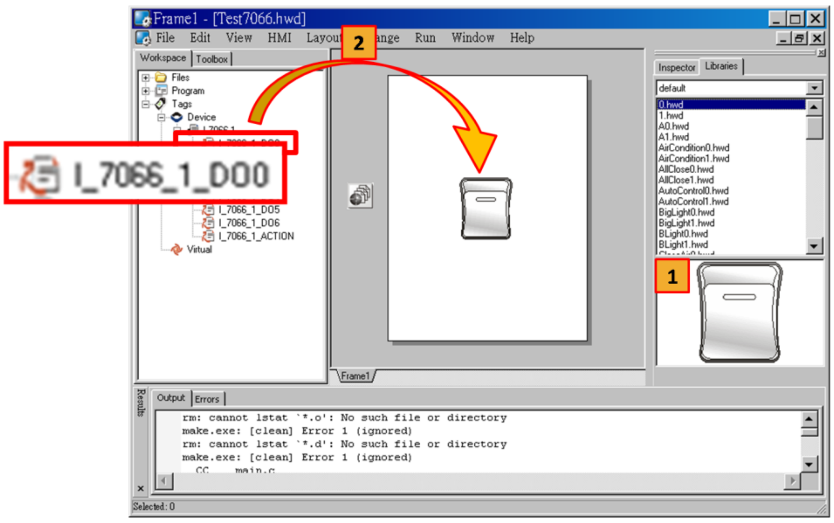


Height	32
ID	18
Left	39
Name	ObjectList
Objects	default\0.hwd
Top	249
Width	32

properties	description
Height	The length of the vertical side of the ObjectList
ID	The serial numbers of the components in the Toolbox and of the frames. These serial numbers are used to identify them.
Left	The x-coordinate of the left-top vertex of the ObjectList
Name	The name of the ObjectList
Objects	The maintained library objects
Top	The y-coordinate of the left-top vertex of the ObjectList
Width	The length of the horizontal side of the ObjectList

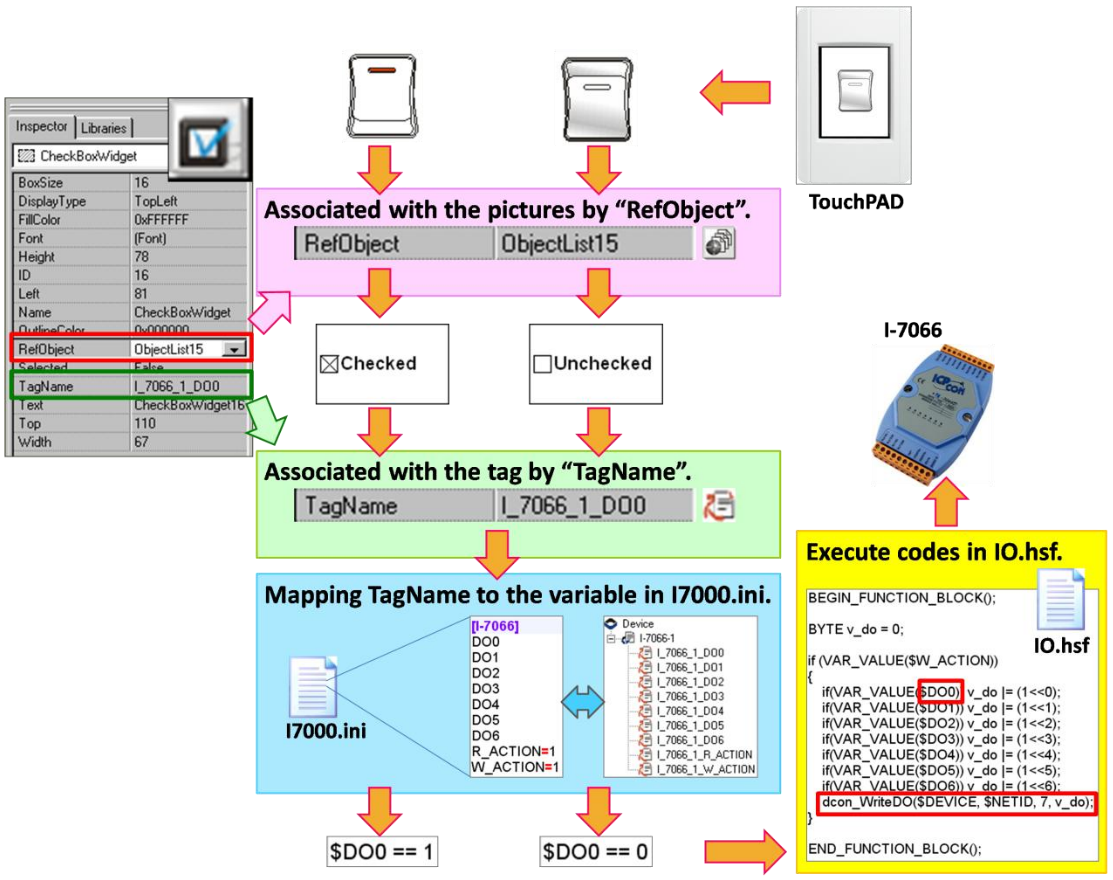
Relationships between TouchPAD and I/O module

Take the I-7066 module for example, click on the “**Register Devices**” option from the “**HMI**” menu or press **F3** on your keyboard to automatically generate tags and then drag and drop the tag on the frame.



```
rm: cannot lstat `*.o': No such file or directory
make.exe: [clean] Error 1 (ignored)
rm: cannot lstat `*.d': No such file or directory
make.exe: [clean] Error 1 (ignored)
  CC     main.c
```

HMIWorks does the followings to build the relationships between the TouchPAD device and I/O modules.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	78
ID	16
Left	81
Name	CheckBoxWidget
OutlineColor	0x000000
RefObject	ObjectList15
Selected	False
TagName	I_7066_1_DO0
Text	CheckBoxWidget16
Top	110
Width	67

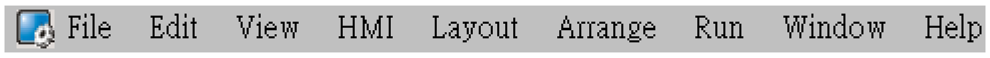
```
BEGIN_FUNCTION_BLOCK();

BYTE v_do = 0;

if (VAR_VALUE($W_ACTION))
{
   if(VAR_VALUE($DO0)) v_do |= (1<<0);
   if(VAR_VALUE($DO1)) v_do |= (1<<1);
   if(VAR_VALUE($DO2)) v_do |= (1<<2);
   if(VAR_VALUE($DO3)) v_do |= (1<<3);
   if(VAR_VALUE($DO4)) v_do |= (1<<4);
   if(VAR_VALUE($DO5)) v_do |= (1<<5);
   if(VAR_VALUE($DO6)) v_do |= (1<<6);
   dcon_WriteDO($DEVICE, $NETID, 7, v_do);
}

END_FUNCTION_BLOCK();
```

Note: The TagName property takes effect only in the programming type Ladder. (It's easier in programming type "Standard C". Control the I/O by using API function, dcon_WriteDO, in the event handler of the CheckBox.)

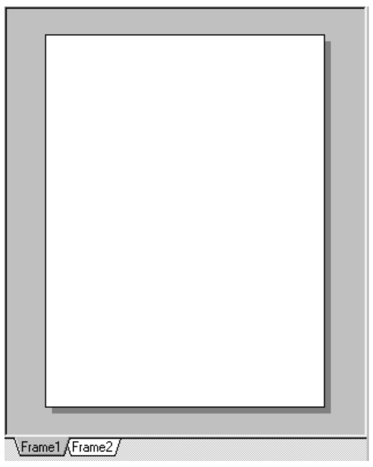
5.5. Menus

All the menus can be accessed from menu bar or the popup menu.

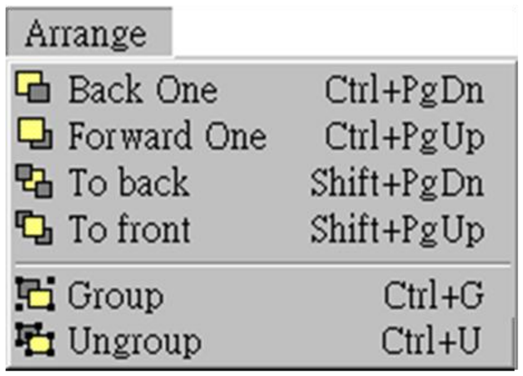
The menu bar:



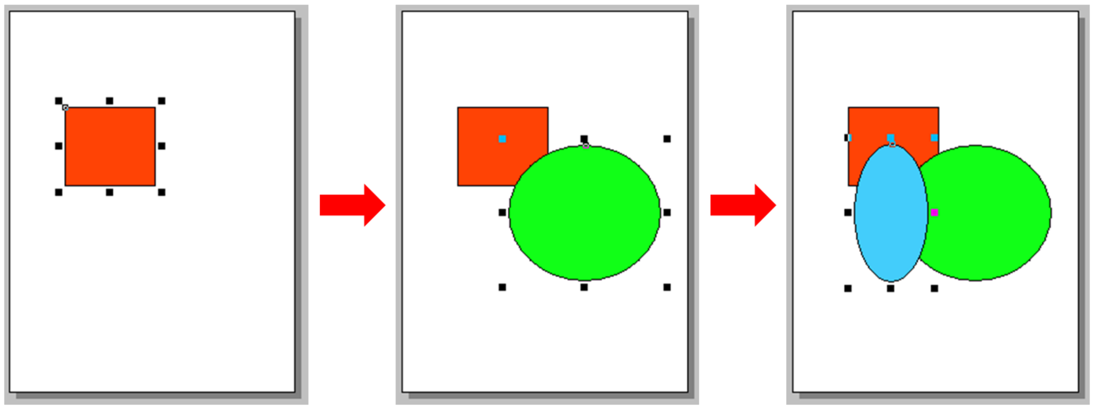
Right click on the frame design area, a popup menu is displayed.
The frame design area:



5.5.1. Cascading and Grouping, Arrange Menu

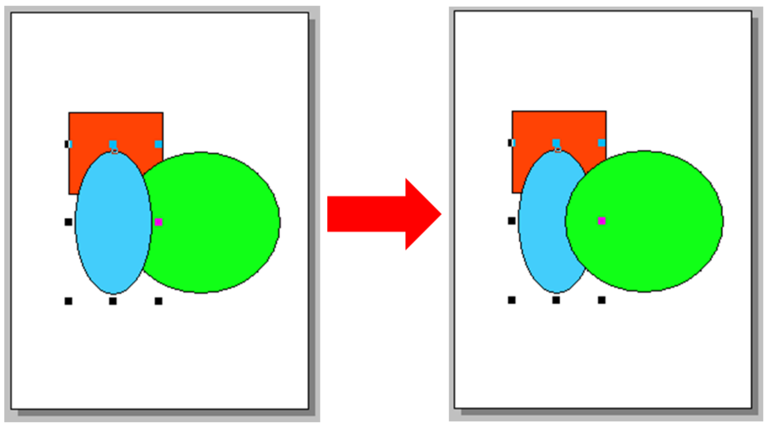


To demonstrate functions of cascading and grouping, first draw three shapes as followings:



Back One

Make the selected object go down a level of the stacks.
For example, select the blue ellipse and click the “**Back One**” option in the “**Arrange**” menu. You can see that the blue ellipse goes down one level in the stack.



Forward One

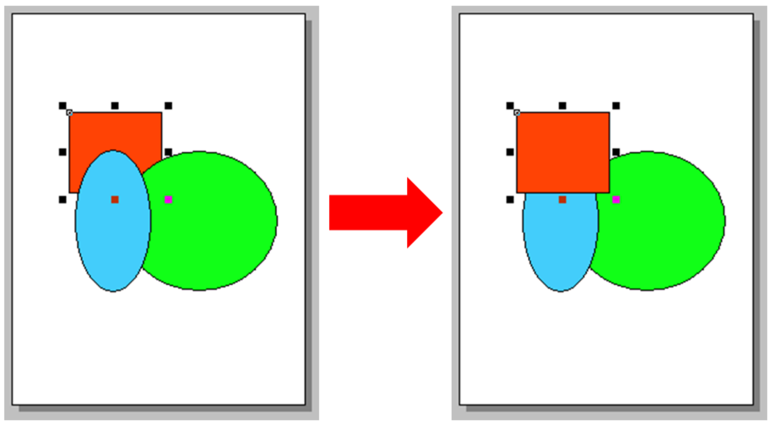
Repeat the similar procedure for the “**Forward One**” option from the “**Arrange**” menu to go up a level in the stack.

To back

Repeat the similar procedure for the “**To back**” option from the “**Arrange**” menu to make the selected object go down to the lowest level of the stack.

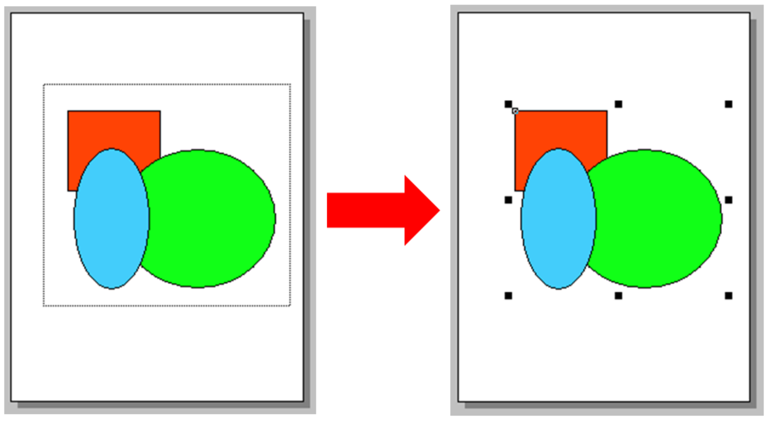
To front

Repeat the similar procedure for the "**To front**" option from the "**Arrange**" menu to make the selected object go up to the highest level of the stack.
For example, select the red square and click "**To front**" in the menu. You can see that the red square goes up to the highest level in the stack.



Group

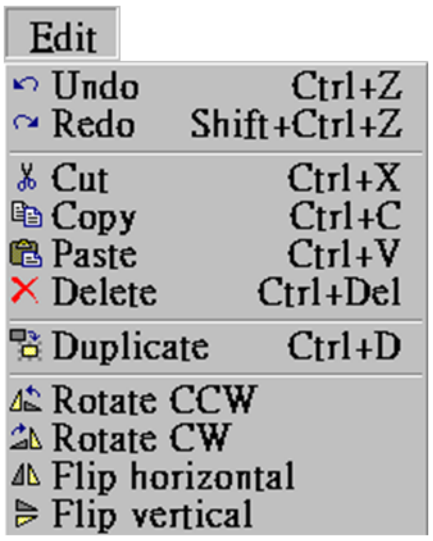
Put components (the Drawing, the Widget and the System components) together as a set, that is, a group.
For example, first circle the items together by a mouse, and then click "**Group**" in the menu. You can see that they are grouped together.



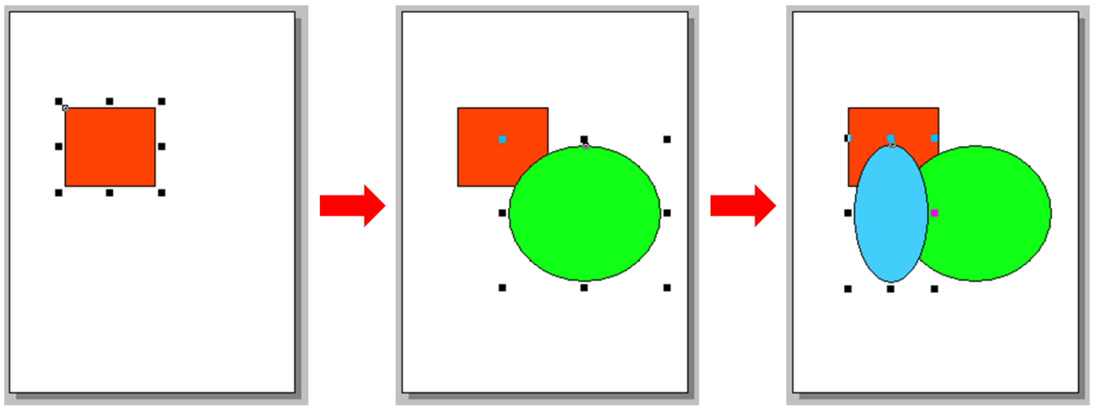
Ungroup

Break a group back into its original separate state.
For example, select the group and then click the "**Ungroup**" option from the "**Arrange**" menu.

5.5.2. Rotating and Flipping, Edit Menu

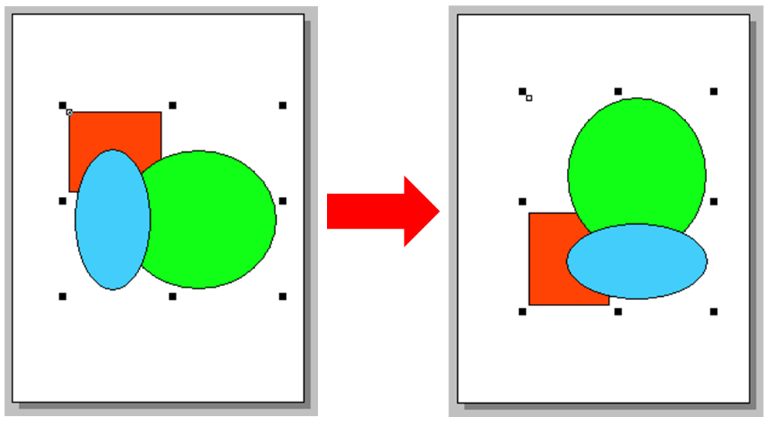


To demonstrate functions of rotating and flipping, first draw three shapes as followings:



Rotate CCW

Rotate the selected item in the counter-clockwise direction.
For example, first put three items into one group, select the group and then click the "**Rotate CCW**" option from the "**Edit**" menu. You can see that this group of shapes is rotated counter-clockwise.

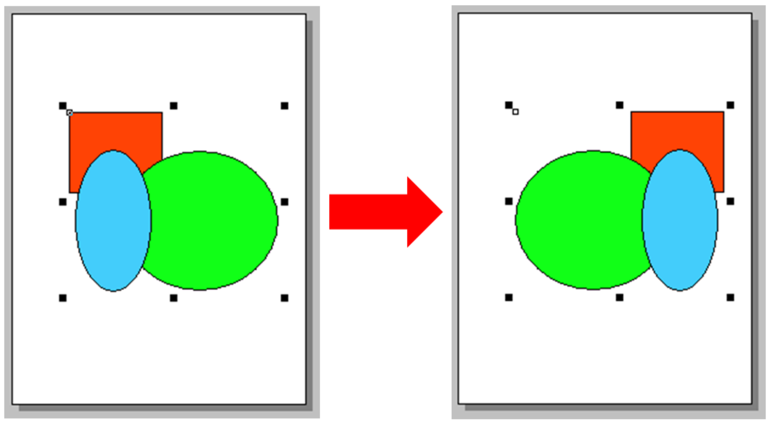


Rotate CW

Similar to the above step, click the "**Rotate CW**" option from the "**Edit**" menu to rotate the selected item in the clockwise direction
For example, first put three items into one group, select the group and then.
You can see that this group of shapes is rotated clockwise.

Flip horizontal

Flip the selected item in the horizontal direction.
For example, first put three items into one group, select the group and then click the "**Flip horizontal**" option from the "**Edit**" menu. You can see that this group of shapes is flipped horizontally.

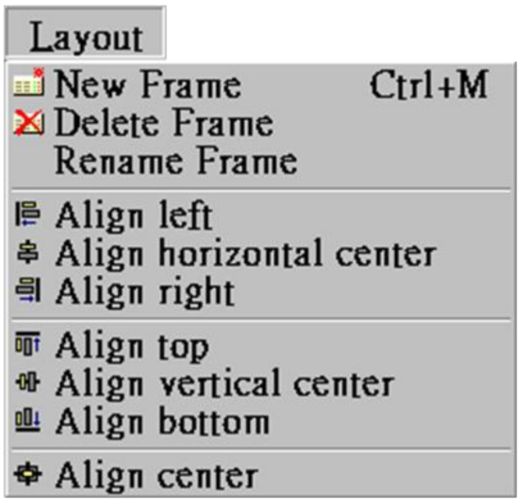


Flip vertical

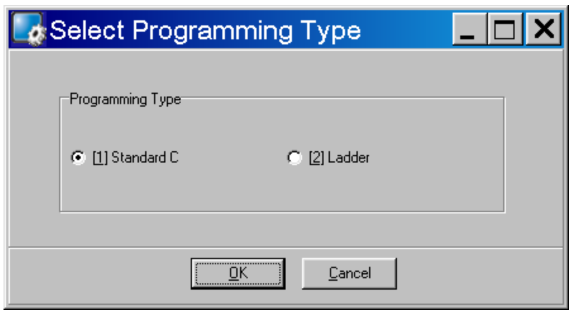
Similar to the above step, click the "**Flip vertical**" option from the "**Edit**" menu to flip the selected item in the vertical direction.

5.5.3. Frame Managing and Aligning, Layout

Menu



● Frame Management:



New Frame

Create a new frame
(select the programming type)

Delete Frame

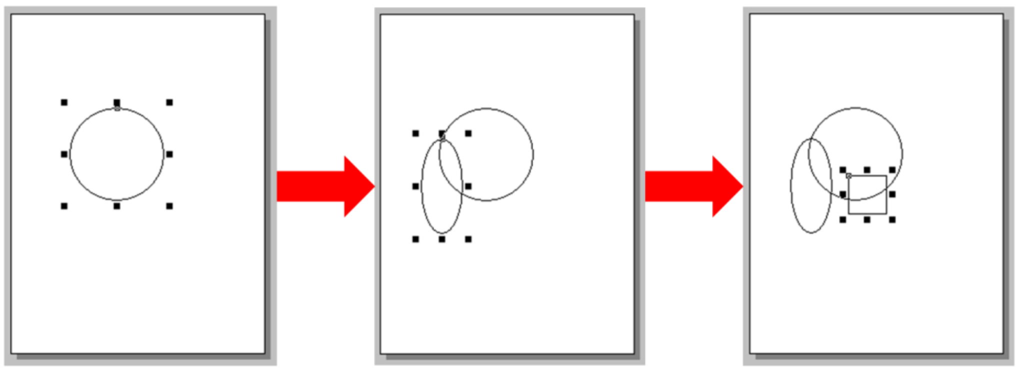
Delete the current frame

Rename Frame

Rename a frame

● Alignment:

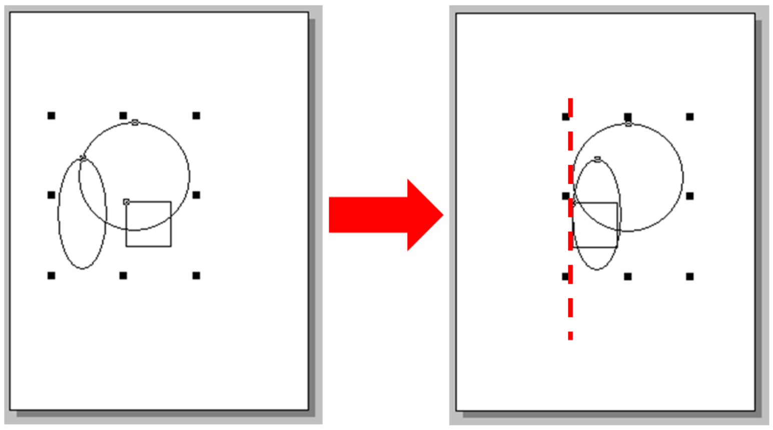
To demonstrate the functions of alignment, draw three shapes as followings



Note: all alignment functions refer to the last shape you draw. In above example, all alignment functions refer to the square.

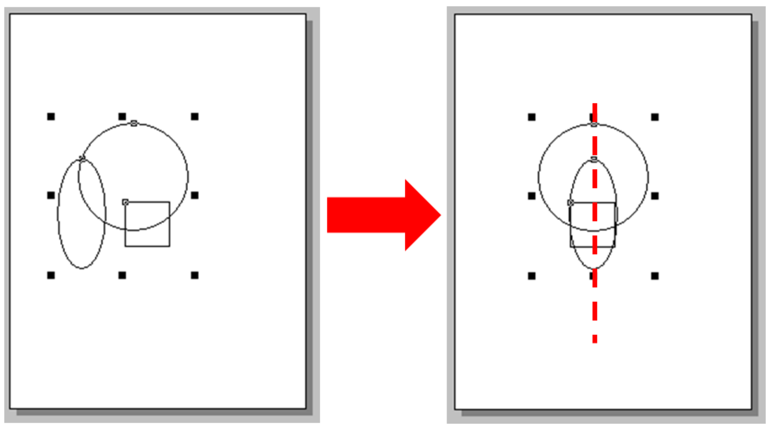
Align left

Align the leftmost edge of all the selected items to that of last-drawn item. For example, select all the items and then click "**Align left**" in the menu.



Align horizontal center

Align the horizontal center of all the selected items to that of last-drawn item. For example, select all the items and then click "**Align horizontal center**" in the menu.



Align right

Align the rightmost edge of all the selected items to that of last-drawn item.

Align top

Align the topmost edge of all the selected items to that of last-drawn item.

Align vertical center

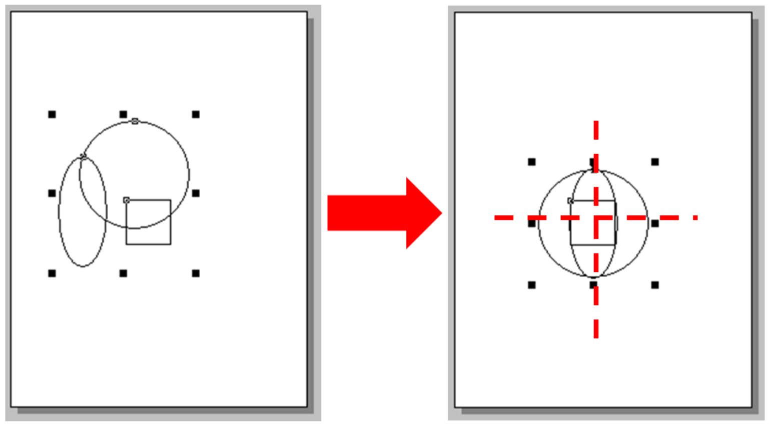
Align the vertical center of all the selected items to that of last-drawn item.

Align bottom

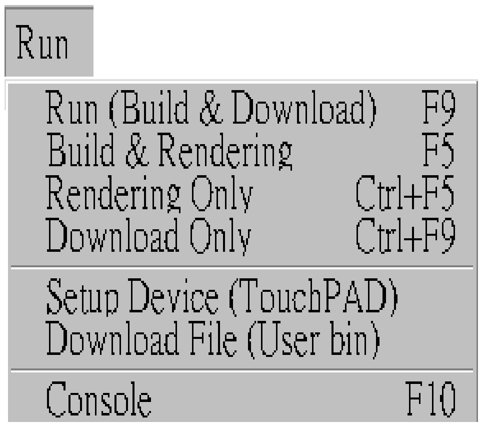
Align the bottommost edge of all the selected items to that of last-drawn item.

Align center

Align the center point of all the selected items to that of last-drawn item.
For example, select all the items and then click “**Align center**” in the menu.



5.5.4. Build and Download to Run, Run Menu



Refer to the chapter, "Setup Devices and Connect to I/O", for "Setup Device".

Other Items in the Run Menu

Run (F9)

➔ Rendering + Build + Download

Rendering and build (F5)

➔ Rendering + Build (Compile and Link)

Rendering Only (Ctrl + F5)

➔ Generate source codes for frames, tools, ladders, etc.

Download Only (Ctrl + F9)

➔ Download the project's bin file to the TouchPAD devices

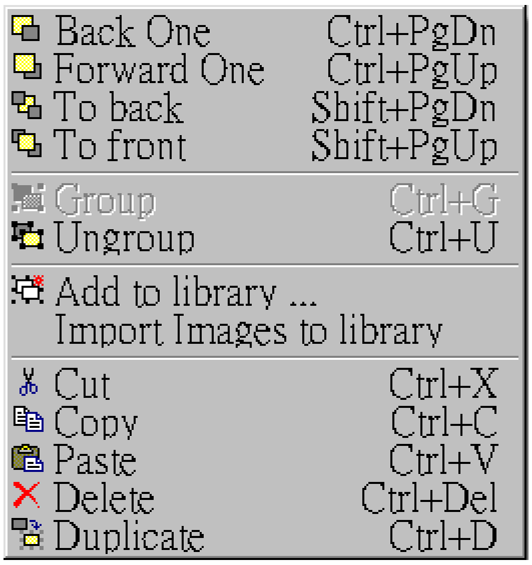
Download File (User bin)

➔ Download a bin file to the TouchPAD devices

Console (F10)

➔ Open a console window (cmd.exe) with environment variables for HMIWorks. Users can modify the generated codes and then re-make the codes. (Use make.exe.)

5.5.5. Library Management, Popup Menu



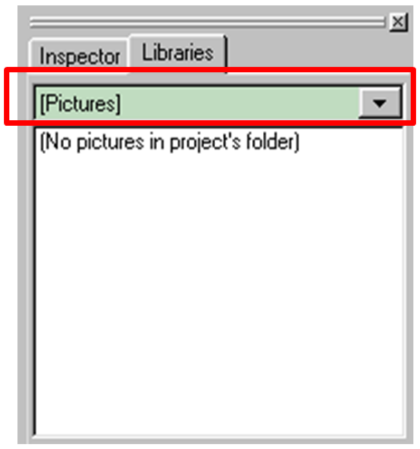
Back One	Ctrl+PgDn
Forward One	Ctrl+PgUp
To back	Shift+PgDn
To front	Shift+PgUp
Group	Ctrl+G
Ungroup	Ctrl+U
Add to library ...	
Import Images to library	
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Delete	Ctrl+Del
Duplicate	Ctrl+D

Adding items to library

All the items added have the file extension “hwd”.

For example as below:

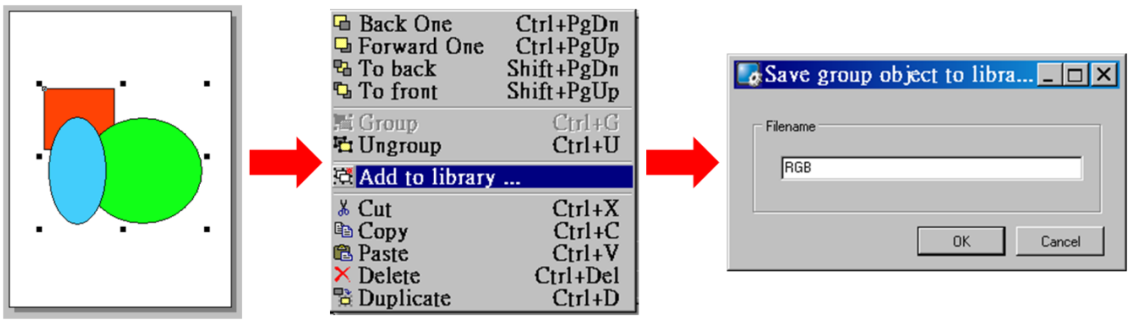
1. Click the “**libraries**” tab, select a folder (where the library object is to be added to) from the dropdown menu as shown in the picture below.



(No pictures in project's folder)

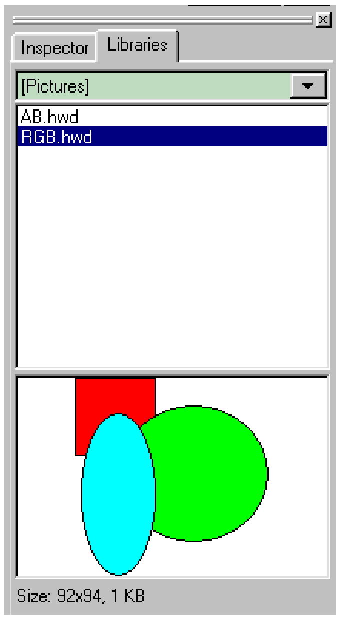
2. Group the selected items.
3. Right click on the frame design area to open the popup menu.
4. Click on “**Add to library …**”

5. Specify the library name and save it to the library.



Filename: RGB

Note: you can preview the library object in the **library** window and the “size” information of that library object is shown below.

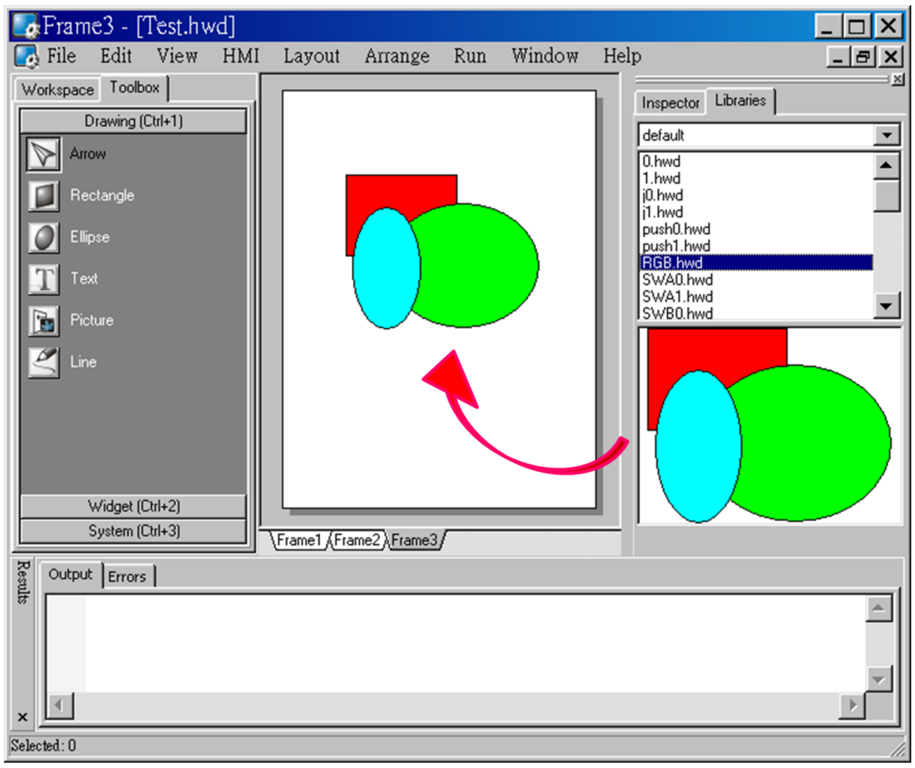


Size: 92x94, 1 KB

Using items from library

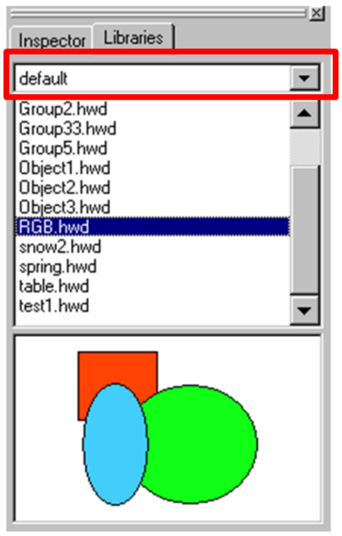
For example as below:

1. Click on the tab of “**Libraries**” to show the library panel.
2. Pick the object you want. You can preview the object in the preview box below.
3. Click (and not released) on the item in the preview box (or in the list) and then drag the item and drop it on the frame design area.



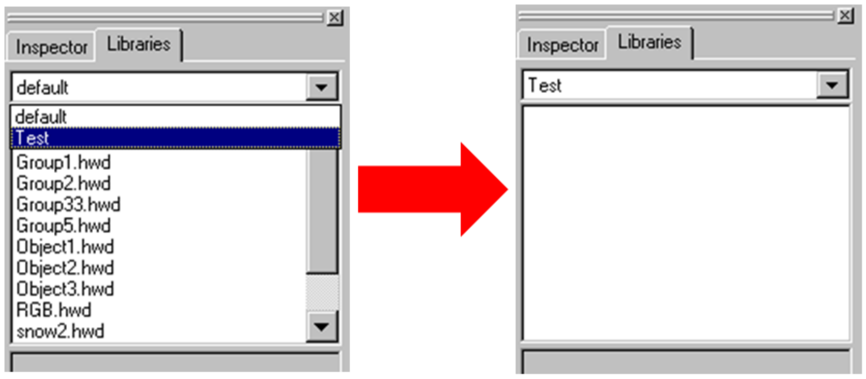
Adding a new folder into library window

Select the folder of the libraries as shown in the picture below.

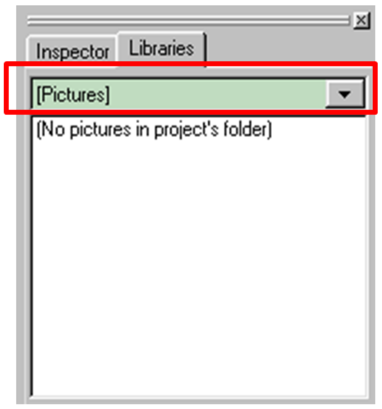


To add a new folder into the **library** window, create a new folder in the following path:
"HMIWorks_install_path\bin\Lib\" where the HMIWorks_install_path is the installation path of HMIWorks.

Supposed the installation path of HMIWorks is "C:\ICPDAS\HMIWorks_Standard". And we want to add a new folder named "Test" into the **library** window. Then all we have the do is creating a new folder named Test in the directory of "C:\ICPDAS\HMIWorks_Standard\bin\Lib".
And then re-open the **library** window, you can see that the new folder "Test" as shown below.
Of course, there's no library item in it. You should add items yourself.

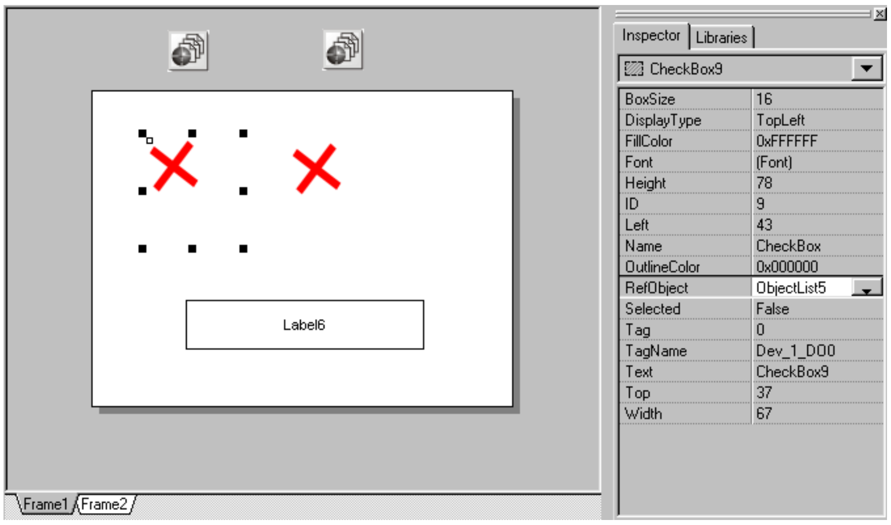


The special [Picture] directory in the project directory



1. Click the "**libraries**" tab, select the "[Picture]" directory from the dropdown menu as shown in the picture above.
2. Unlike others options in that dropdown menu, "[Picture]" directory is at the location of the project directory. Any library that is added to the "[Picture]" directory is always together with the project and makes the project portable among different computers.

3. When opening a project, a red cross will be shown on the frame panel if HMIWorks fails to load the image as shown in the below picture.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	78
ID	9
Left	43
Name	CheckBox
OutlineColor	0x000000
RefObject	ObjectList5
Selected	False
Tag	0
TagName	Dev_1_DO0
Text	CheckBox9
Top	37
Width	67

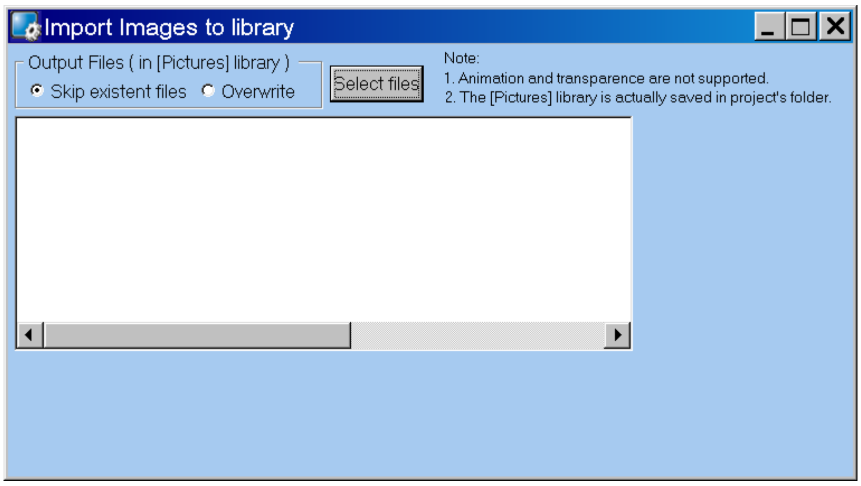
Import Images to Library

This option can also be accessed from the **File** menu.

Click this option to select more than one image files, transform them into the .hwd file format which HMIWorks can recognize and finally put these files in the [Pictures] folder in the current project directory.

Since the transformed .hwd files are put in the [Pictures] folder of a project, users should create or open a project to execute this option.

As shown below, click the “**Select files**” button to execute.



Output Files (in [Pictures] library)
[✓ Skip existent files] Overwrite

Note:
1. Animation and transparence are not supported.
2. The [Pictures] library is actually saved in project's folder.

Note: Now, we support GIF/JPG/BMP/ICO/WMF/EMF image formats.

6. Making a Simple Project

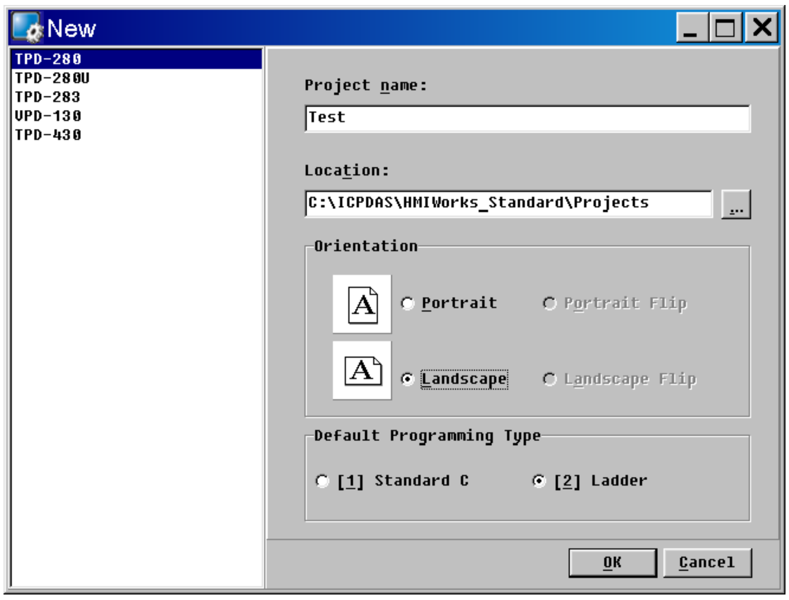
There are two programming types in HMIWorks. In this chapter, we introduce how to build your first project for each programming type.

6.1. Your First Project Using Standard C

1. Creating a new project

Click the "**New…**" option from the "**File**" menu and then select the Model, specify the Project name, the Location, the Orientation, and the Programming Type.

Here we choose **programming type** as [1] Standard C.



New

TPD-280
TPD-280U
TPD-283
VPD-130
TPD-430

Project name: Test

Location: C:\ICPDAS\HMIWorks_Standard\Projects

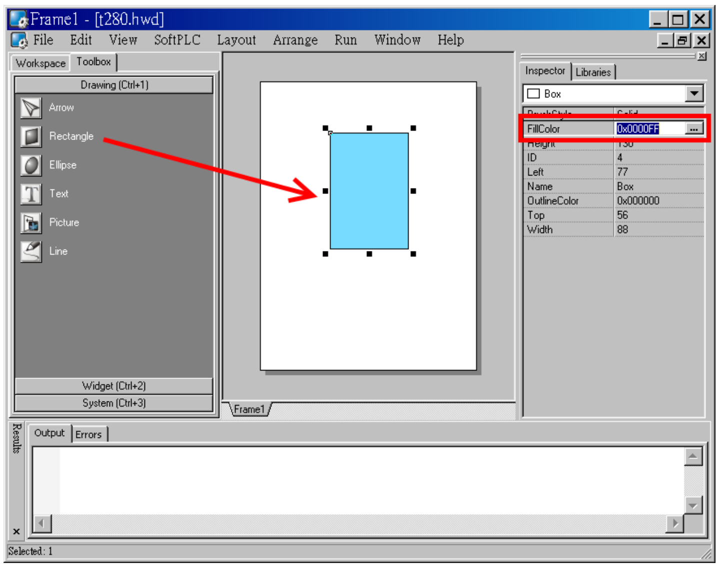
Orientation: Portrait [✓ Landscape] Portrait Flip Landscape Flip

Default Programming Type: [1] Standard C [✓ [2] Ladder]

OK Cancel

2. Designing the Graphic User Interface

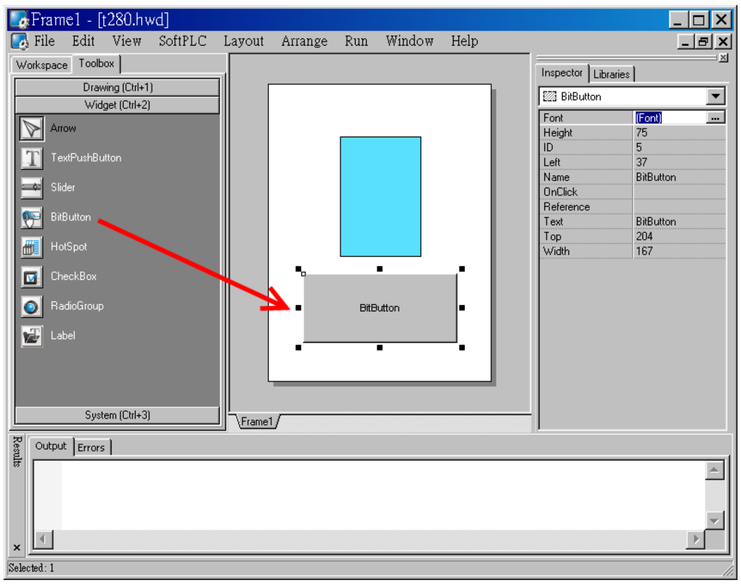
For example, draw a rectangular and fill the color. Of course, you can draw more complex and beautiful figures. Here, we simply demonstrate how to make a simple project.



Box

BrushStyle	Solid
FillColor	0x0000FF
Height	130
ID	4
Left	77
Name	Box
OutlineColor	0x000000
Top	56
Width	88

And then select a Widget. For example, pick a BitButton.

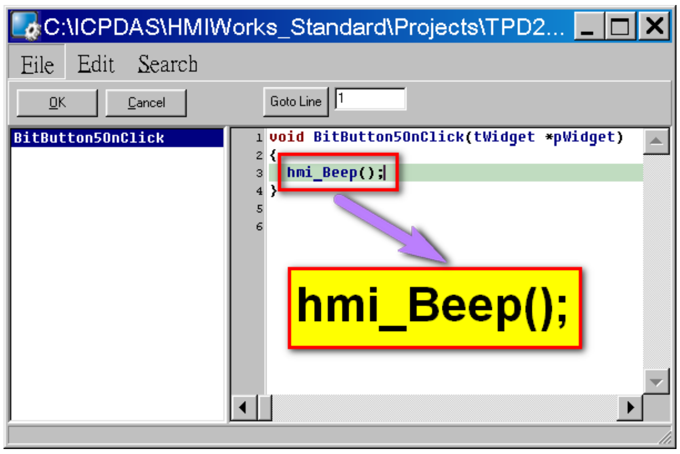


BitButton

Font	(Font)
Height	75
ID	5
Left	37
Name	BitButton
OnClick	
Reference	
Text	BitButton
Top	204
Width	167

3. Modifying Source Codes

Double click the BitButton in the frame design area to open the programming window. Use “hmi_Beep();” to sound a beep for example, then press **OK**.



```
void BitButton5OnClick(tWidget *pWidget)
{
hmi_Beep();
}
```

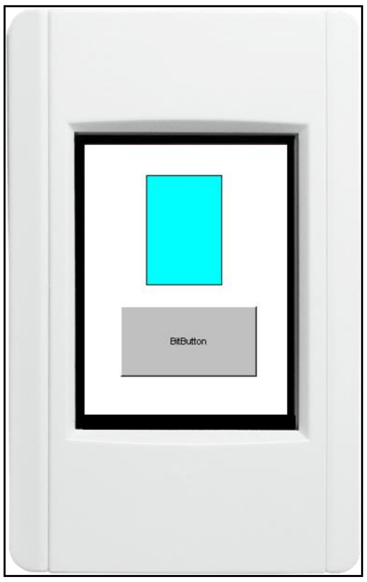
4. Setup Device

Refer to the "Setup Devices" section for details.

5. Compiling and Downloading to Run

After connecting to the TouchPAD device, press **F9** to run (or click the "**Run**" option from the "**Run**" menu.

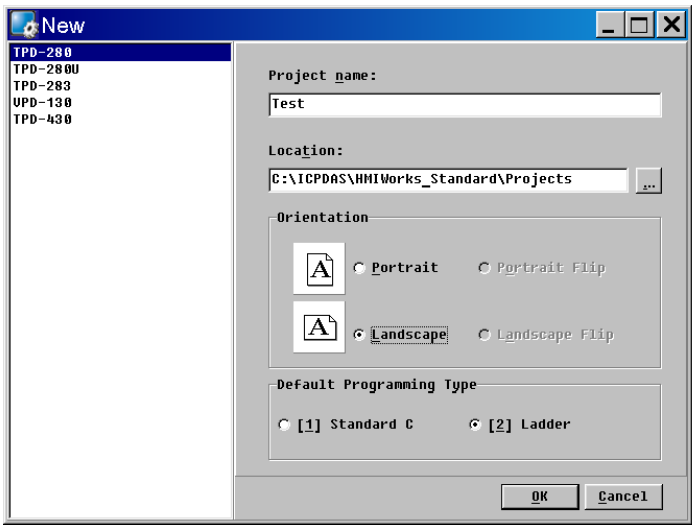
As the shown in the figure below, pressing the button makes TouchPAD sound a beep.



6.2. Your First Project Using Ladder

1. Creating a new project

Click the “**New…**” option from the “**File**” menu, and then select the Model, specify the Project name, the Location, the Orientation, and the Programming Type. Here we choose **programming type** as [2] Ladder.



TPD-280
TPD-280U
TPD-283
VPD-130
TPD-430

Project name: Test

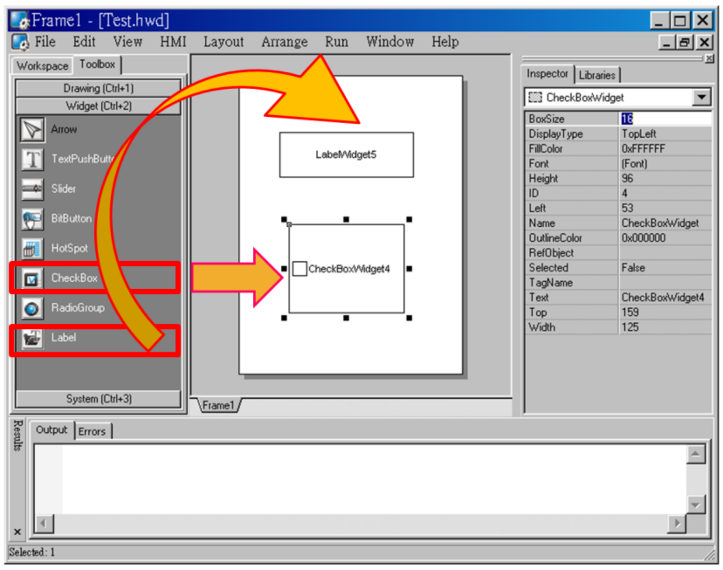
Location: C:\ICPDAS\HMIWorks_Standard\Projects

Orientation: Portrait / Portrait Flip / [✓ Landscape] / Landscape Flip

Default Programming Type: [1] Standard C / [✓ [2] Ladder]

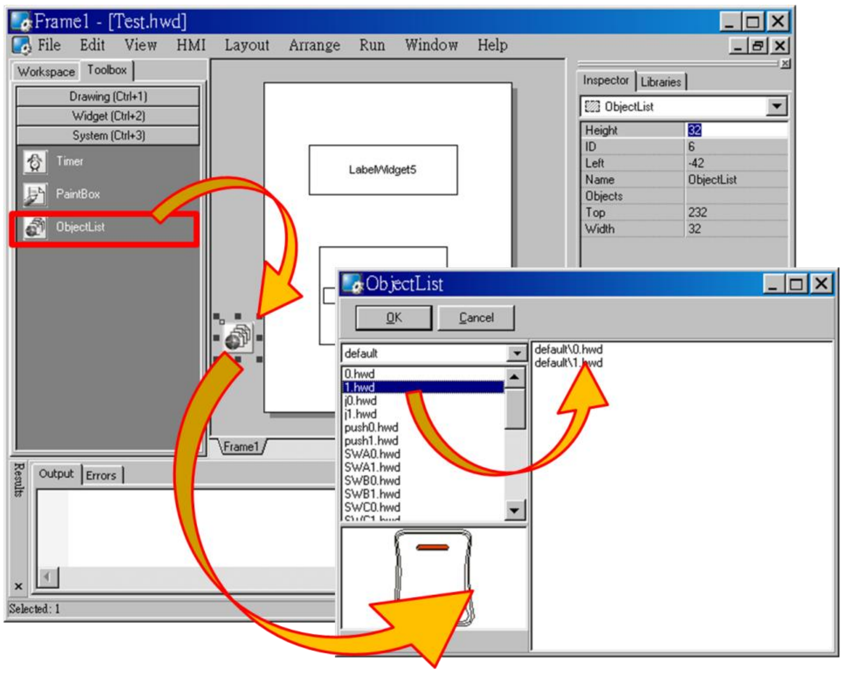
2. Designing the Graphic User Interface

For example, place a CheckBox component and a Label component on the frame panel. Here, we plan to take the CheckBox component as an input and the Label component as an output.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	96
ID	4
Left	53
Name	CheckBoxWidget
OutlineColor	0x000000
RefObject	
Selected	False
TagName	
Text	CheckBoxWidget4
Top	159
Width	125

Select an ObjectList component and click on the frame design area. Double click the ObjectList icon to open the "**ObjectList**" window. In the "**ObjectList**" window, double click to select the pictures you want. Users need to double click on two pictures, one is for the checked state of the CheckBox component and the other is for the unchecked state. Press **OK** to finish this step.

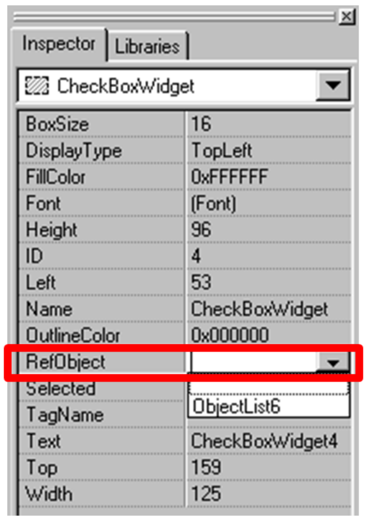


Height	32
ID	6
Left	-42
Name	ObjectList
Objects	
Top	232
Width	32

```
0.hwd
1.hwd
j0.hwd
j1.hwd
push0.hwd
push1.hwd
SWA0.hwd
SWA1.hwd
SWB0.hwd
SWB1.hwd
SWC0.hwd
```

```
default\0.hwd
default\1.hwd
```

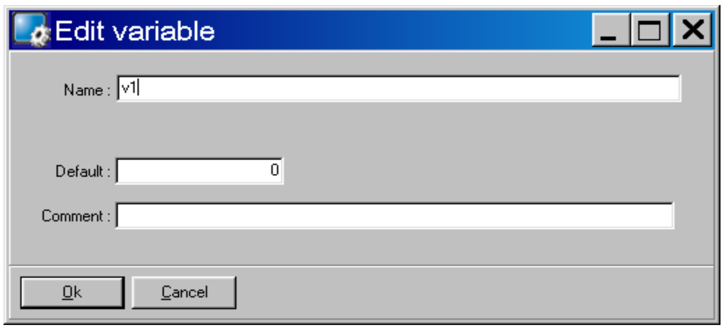
Make the CheckBox component refer to the ObjectList component by setting the property "RefObject" to the ObjectList component. Now toggling the states of the CheckBox component becomes the switching of the pictures in the ObjectList component.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	96
ID	4
Left	53
Name	CheckBoxWidget
OutlineColor	0x000000
RefObject	
Selected	ObjectList6
TagName	
Text	CheckBoxWidget4
Top	159
Width	125

3. Designing the Ladder Diagram

First, add virtual tags (variables) for the ladder diagram. Press **F2** on your keyboard or click the "**New Virtual Tag**" option from the "**HMI**" menu. Here, we add two tags, v1 and v2, for example.

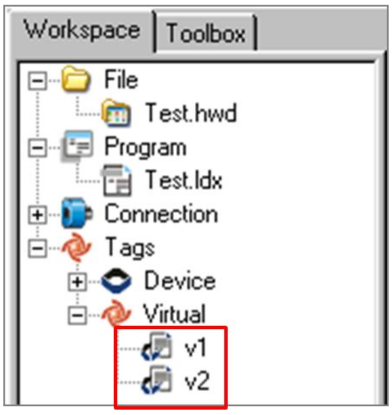


Name : v1

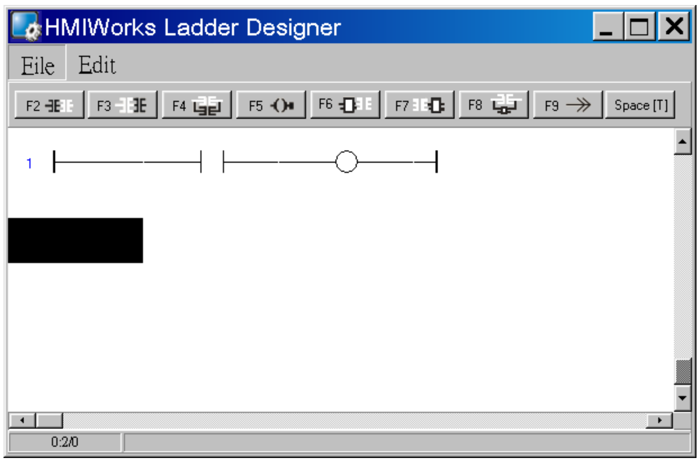
Default : 0

Comment :

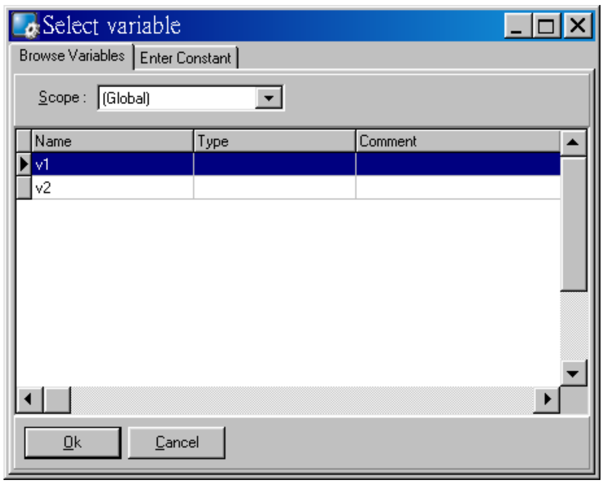
After adding the tags, users can verify in the **Workspace**.



Press **F4** on your keyboard or click the "**Ladder Designer**" option from the "**HMI**" menu to open the **Ladder Designer** window. In the **Ladder Designer** window, press **F2** to create a new rung.



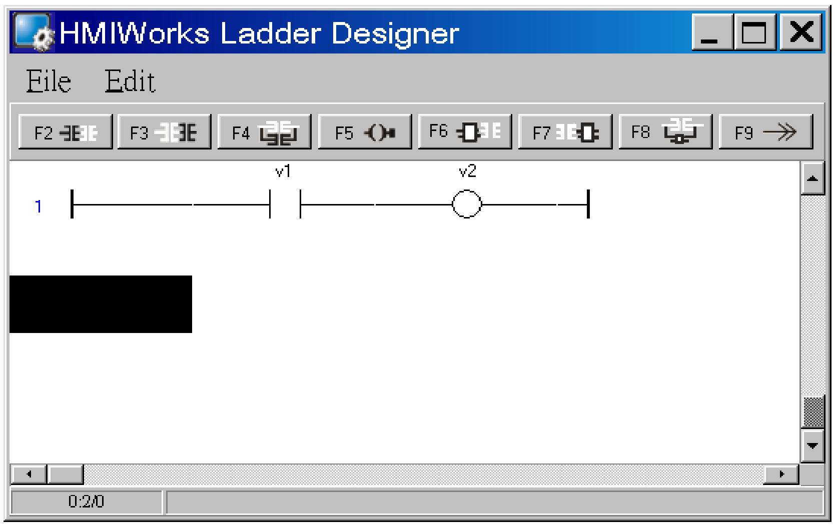
Double click the contact input of the first rung in the **Ladder Designer** window. Then the “**Select variable**” dialog box is displayed. Choose the variable to associate with the contact input.



Scope : (Global)

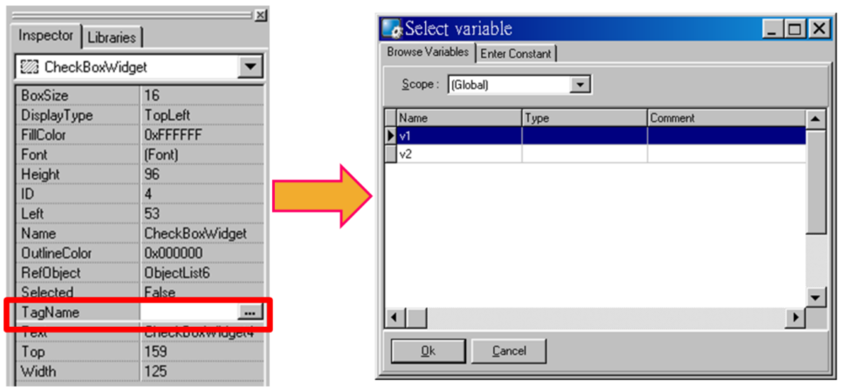
Name	Type	Comment
v1		
v2		

Here, we select variable v1 to associate the contact input. Repeat the same procedure to associate v2 with the coil output.



[redacted]

Then we associate the CheckBox component with the v1 tag and the Label component with the v2 tag by the “TagName” properties of themselves.

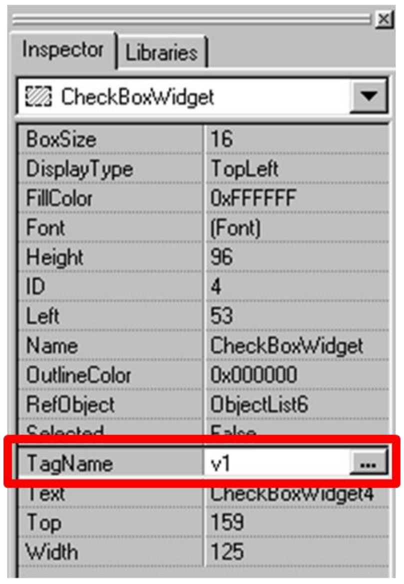


BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	96
ID	4
Left	53
Name	CheckBoxWidget
OutlineColor	0x000000
RefObject	ObjectList6
Selected	False
TagName	
Text	CheckBoxWidget4
Top	159
Width	125

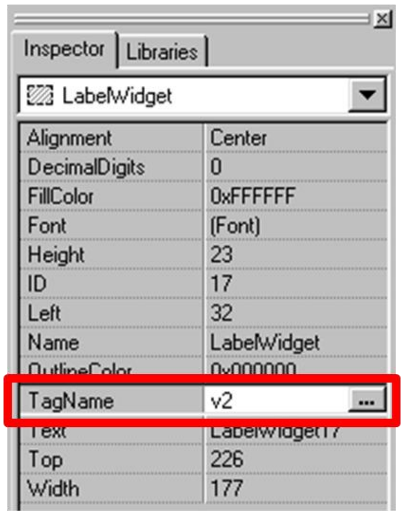
Scope : (Global)

Name	Type	Comment
v1		
v2		

After setting the "TagName" properties, users can verify in the **Inspector**.



BoxSize	16
DisplayType	TopLeft
FillColor	0xFFFFFF
Font	(Font)
Height	96
ID	4
Left	53
Name	CheckBoxWidget
OutlineColor	0x000000
RefObject	ObjectList6
Selected	False
TagName	v1
Text	CheckBoxWidget4
Top	159
Width	125



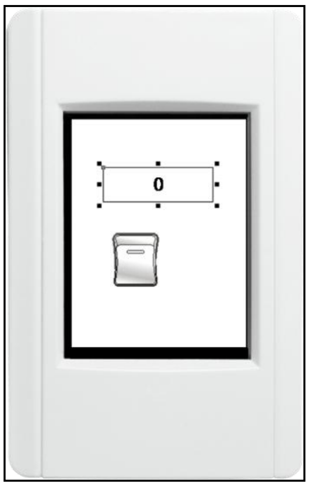
Alignment	Center
DecimalDigits	0
FillColor	0xFFFFFF
Font	(Font)
Height	23
ID	17
Left	32
Name	LabelWidget
OutlineColor	0x000000
TagName	v2
Text	LabelWidget17
Top	226
Width	177

4. Setup Device

Refer to the section "Setup Devices" for details.

5. Compiling and Downloading to Run

After connecting to the TouchPAD device, press **F9** on your keyboard to run (or click the "**Run**" option from the "**Run**" menu).
As shown in the figure below, pressing the button switches the value of the Label from 0 → 1, or 1 → 0.

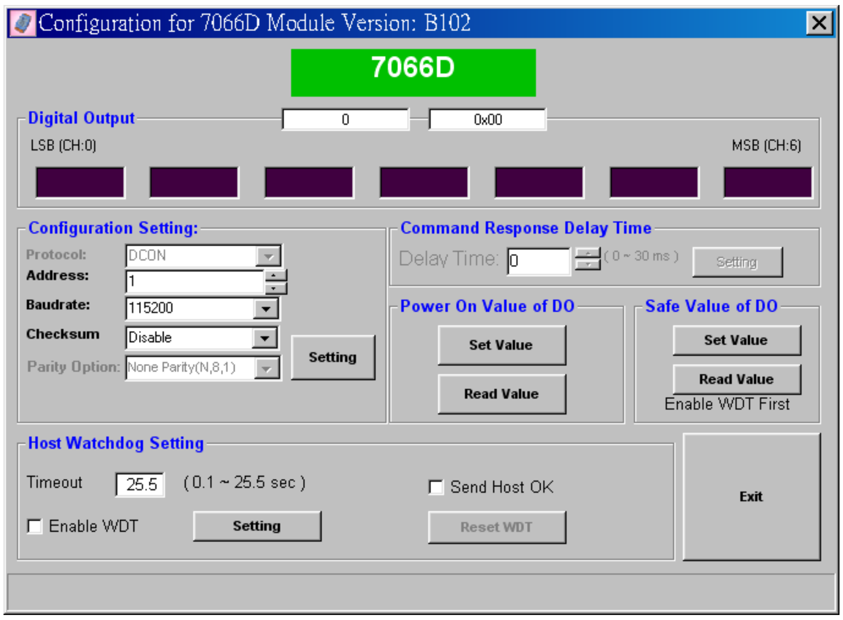


6.3. Integrating TPD-280 Series with I/O modules

In this example, we use the TPD-280 device to control an I-7066 module, the 7-channel photo-MOS relay output module of ICP DAS. First, put the I-7066 module in the same RS-485 network of the TPD-280 device and configure the settings of the I-7066 module with the DCON Utility (baudrate, data bit, parity, stop bit, Net ID, etc.).

1. Using DCON Utility to Set Up I-7066

Download the DCON Utility to install and refer to its user manual.
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/
Then use the DCON Utility to set up the I-7066 module. At least set the followings: Address(Net ID), Baudrate, Databit, Parity, and Stopbit.


Configuration for 7066D Module Version: B102

7066D

Digital Output: 0, 0x00

LSB (CH:0) MSB (CH:6)

Configuration Setting:
Protocol: DCON
Address: 1
Baudrate: 115200
Checksum: Disable
Parity Option: None Parity(N,8,1)

Command Response Delay Time
Delay Time: 0 (0 ~ 30 ms)

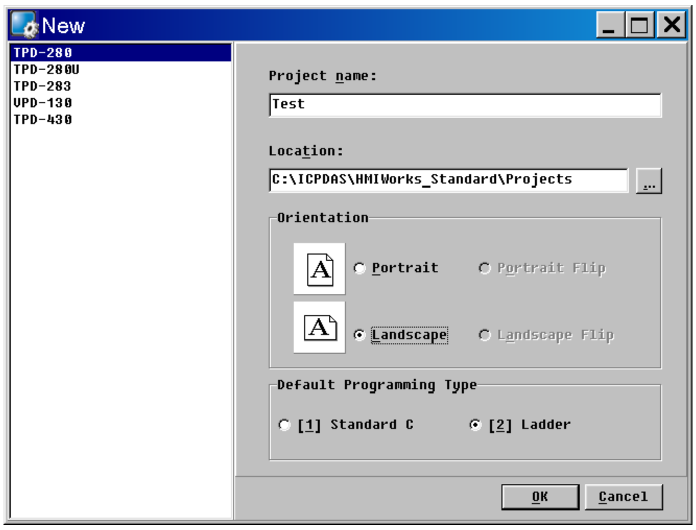
Power On Value of DO

Safe Value of DO
Enable WDT First

Host Watchdog Setting
Timeout 25.5 (0.1 ~ 25.5 sec)
☐ Enable WDT
☐ Send Host OK

2. Creating a new project

Click the “**New…**” option from the “**File**” menu and then select the Model, specify the Project name, the Location, the Orientation, and the Programming Type. Here we choose **programming type** as [2] Ladder.


New

TPD-280
TPD-280U
TPD-283
VPD-130
TPD-430

Project name: Test

Location: C:\ICPDAS\HMIWorks_Standard\Projects

Orientation
Portrait [✓ Landscape] Portrait Flip Landscape Flip

Default Programming Type
[1] Standard C [✓ [2] Ladder]

3. Designing the Graphic User Interface

We can skip this step.

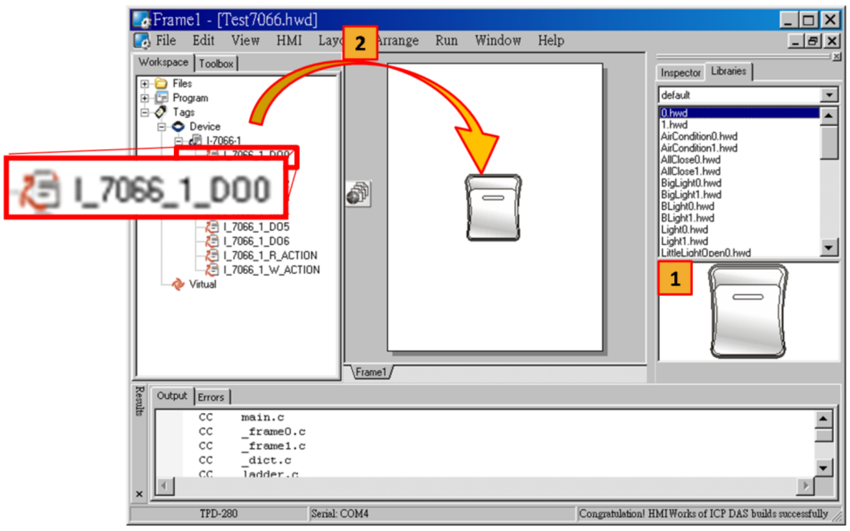
Here we just demonstrate how to quickly complete a whole new project with I/O modules of ICP DAS.

4. Designing the Ladder Diagram

Press **F3** on your keyboard or click the “**Register Devices**” option from the “**HMI**” menu to open the “**Devices**” window to register the I-7066 module.

Refer to the section “Connect to I/O Modules” for details.

Click the “**Libraries**” tab to select a picture to represent the tag in the “**Libraries**” panel. Drag and drop the tag that is corresponding to the DO0 of I-7066. On the frame design area, the picture you just select is now on the frame.



```
CC     main.c
CC     _frame0.c
CC     _frame1.c
CC     _dict.c
CC     ladder.c
```

Congratulation! HMI Works of ICP DAS builds successfully

5. Setup Device

Refer to the section “Setup Devices” for details.

6. Compiling and Downloading to Run

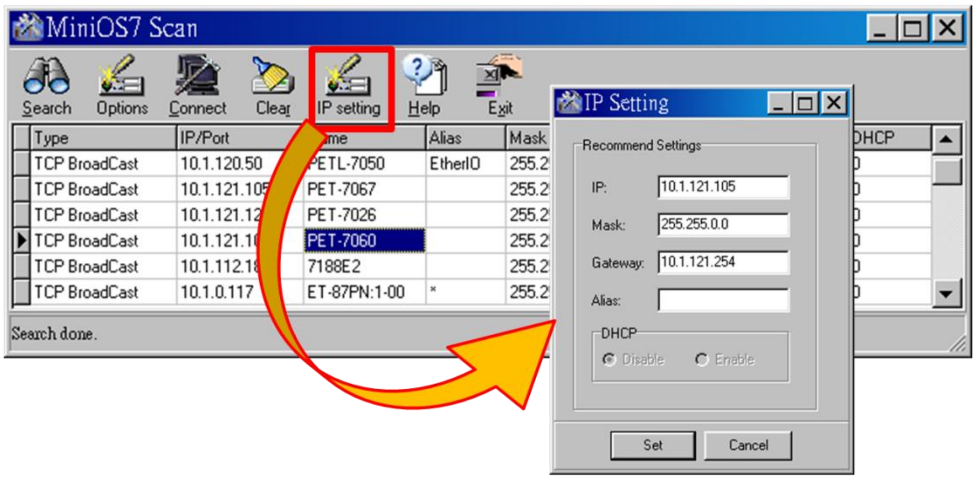
After connecting to the TouchPAD device, press **F9** on your keyboard to run (or click the “**Run**” option from the “**Run**” menu).
As shown in the figure below, pressing the button switches the output of channel 0 of the I-7066 module.

6.4. Integrating TPD-283 Series with I/O modules

In this example, we use the TPD-283 device to control a PET-7060 module, the 6-channel Power Relay Output, 6-channel Isolation Digital Input and PoE module of ICP DAS. First, put the PET-7060 module in the Ethernet network of the TPD-283 device and use a browser to configure the PET-7060 module.

1. Configuring PET-7066 by a Browser

Download the MiniOS7 Utility and its user manual from ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/
Then use the MiniOS7 Utility to configure the IP settings of the PET-7060 module. (Be sure to make the PET-7060 module and your PC in the same subnet.) Press **F12** on your keyboard to scan through the network. Then click the PET-7060 module that is found and then click the “**IP setting**” button to configure the IP settings.



Type	IP/Port	me	Alias	Mask	DHCP
TCP BroadCast	10.1.120.50	PETL-7050	EtherIO	255.2	0
TCP BroadCast	10.1.121.105	PET-7067		255.2	0
TCP BroadCast	10.1.121.12	PET-7026		255.2	0
TCP BroadCast	10.1.121.1	PET-7060		255.2	0
TCP BroadCast	10.1.112.18	7188E2		255.2	0
TCP BroadCast	10.1.0.117	ET-87PN:1-00	*	255.2	0

Search done.

IP Setting

Recommend Settings

IP: 10.1.121.105

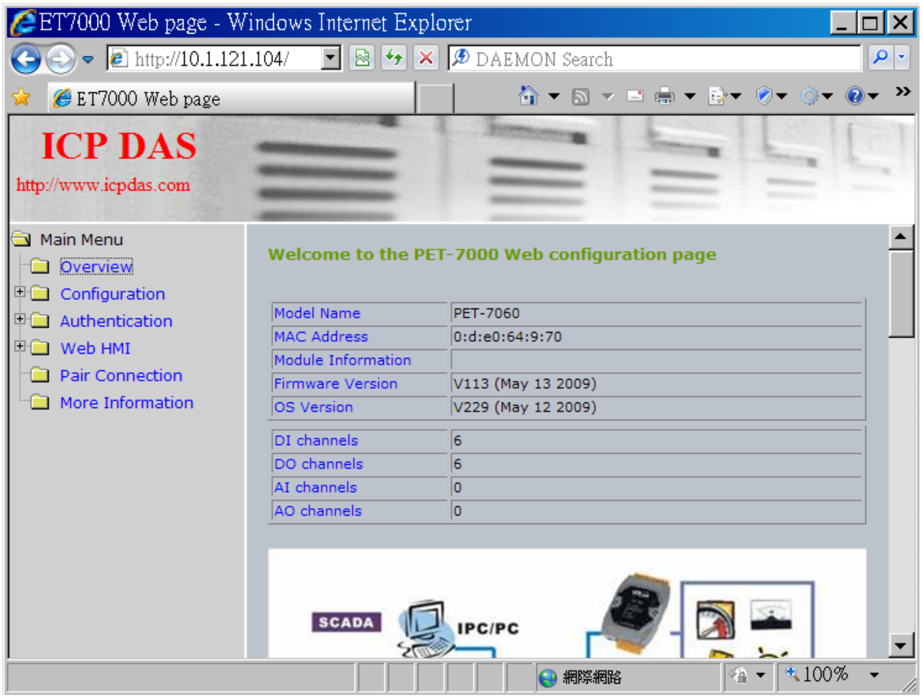
Mask: 255.255.0.0

Gateway: 10.1.121.254

Alias:

DHCP: [✓ Disable] Enable

Finally, connect to the PET-7060 module and configure it by a browser.



ET7000 Web page - Windows Internet Explorer

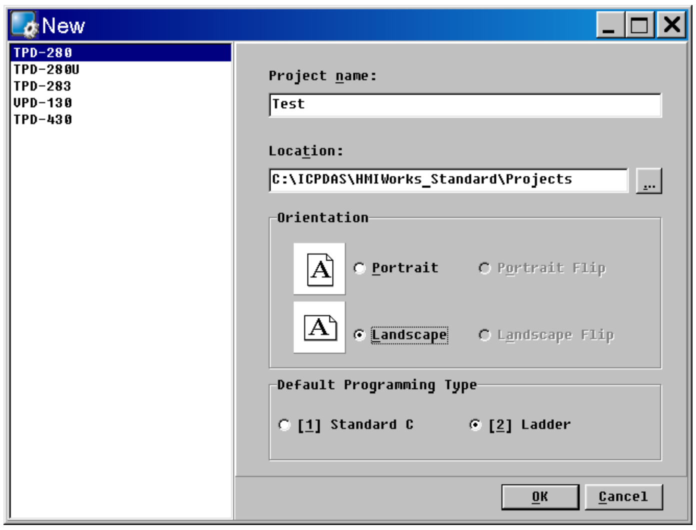
http://10.1.121.104/

Welcome to the PET-7000 Web configuration page

Model Name	PET-7060
MAC Address	0:d:e0:64:9:70
Module Information	
Firmware Version	V113 (May 13 2009)
OS Version	V229 (May 12 2009)
DI channels	6
DO channels	6
AI channels	0
AO channels	0

2. Creating a New Project

Click the “**New…**” option from the “**File**” menu, and then select the Model, specify the Project name, the Location, the Orientation, and the Programming Type. Here we choose **programming type** as [2] Ladder.



Project name: Test

Location: C:\ICPDAS\HMIWorks_Standard\Projects

Orientation: Portrait [✓ Landscape]

Default Programming Type: [1] Standard C [✓ [2] Ladder]

3. Designing the Graphic User Interface

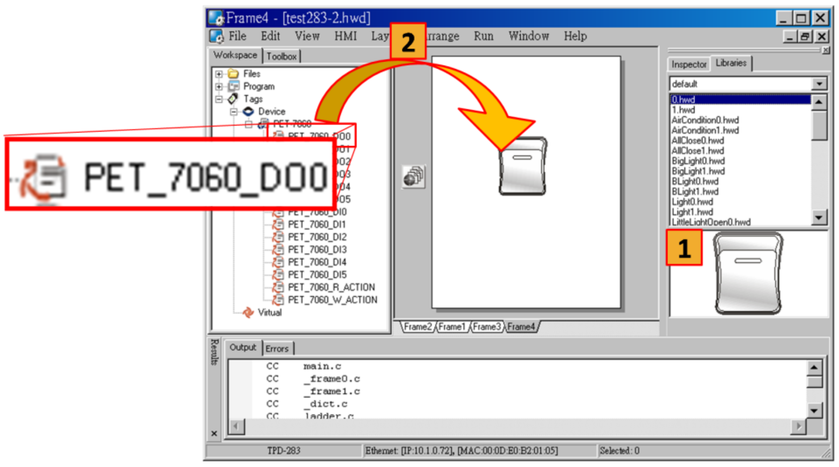
We can skip this step.
Here we just demonstrate how to quickly complete a whole new project with I/O modules of ICP DAS.

4. Designing the Ladder Diagram

Press **F3** in your keyboard or click the “**Register Devices**” option from the “**HMI**” menu to open the “**Devices**” window to register the PET-7060 module.

Refer to section “Connect to I/O Modules” for details.

Click the “**Libraries**” tab to select a picture to represent the tag in the “**Libraries**” panel. Drag and drop the tag that is corresponding to the DO0 of the PET-7060 module to the frame design area. On the frame design area, the picture you just select is now on the frame.



5. Setup Device

Refer to "Setup Devices" for details.

6. Compiling and Downloading to Run

After connecting to the TPD-283 device, press **F9** on your keyboard to run (or click the "**Run**" option from the "**Run**" menu).
As shown in the figure below, pressing the button switches the output of channel 0 of the PET-7060 module.

7. Advanced Programming in C

We have an API reference for TouchPAD.
ftp://ftp.icpdas.com/pub/cd/touchpad/document/english/api_reference/

Though you can refer to the generated codes to learn how to use these API functions, all the API functions are defined in header files in the following path: “C:\ICPDAS\HMIWorks_Standard\include\grlib” and “C:\ICPDAS\HMIWorks_Standard\include”, where “C:\ICPDAS\HMIWorks_Standard” is the installation path.

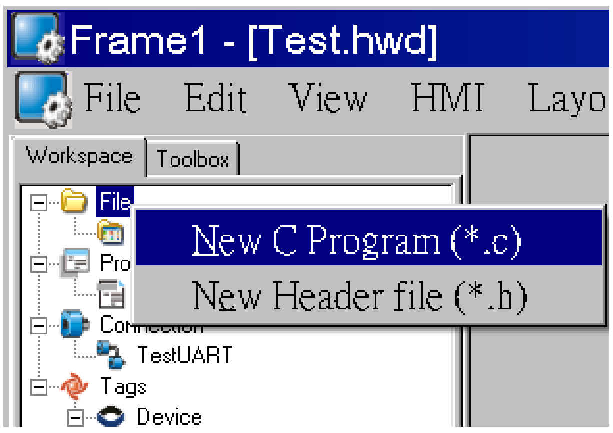
We give some examples in this chapter.

7.1. Adding a New File to Project

Before introducing the details, first we show how to add a new file (.c or .h) to the project.

1. Go to **Workspace**.
2. Right click on the “**File**” item and a pop-up menu is displayed.
3. On that pop-up menu, choose the type of the file you want to add.

As the following figure shows:

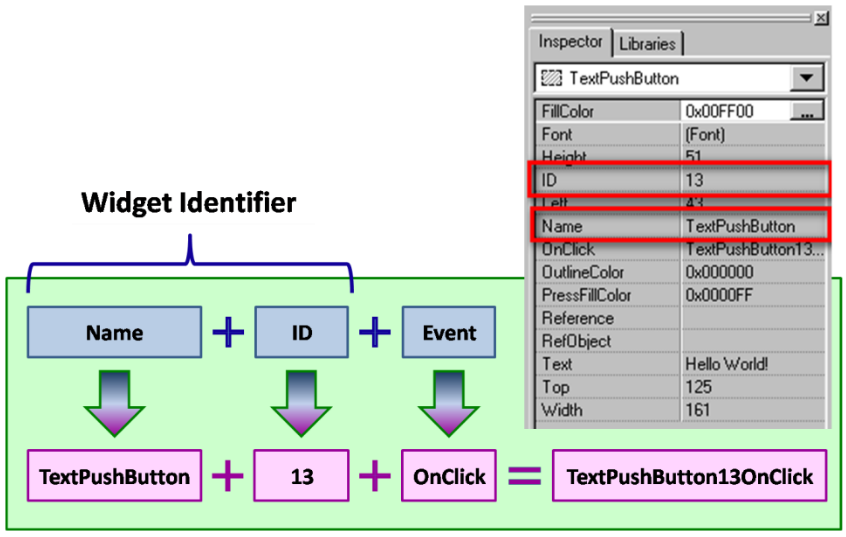


7.2. Updating Properties in Run Time

It is a bit more complicated to change the properties of widgets in the run time. In this section, we demonstrate some commonly-used cases, including:

1. The “FillColor” and “Text” properties of a TextPushButton component
2. The percentage of a Slider component
3. The “Selected” property of a CheckBox component
4. The “Font”, the “Text” and the “TextColor” properties of a Label component

Updating properties is implemented in the event handlers of the widgets.
Note: The naming convention of the event handler of the widget (here the widget is the TextPushButton component) is shown as below:



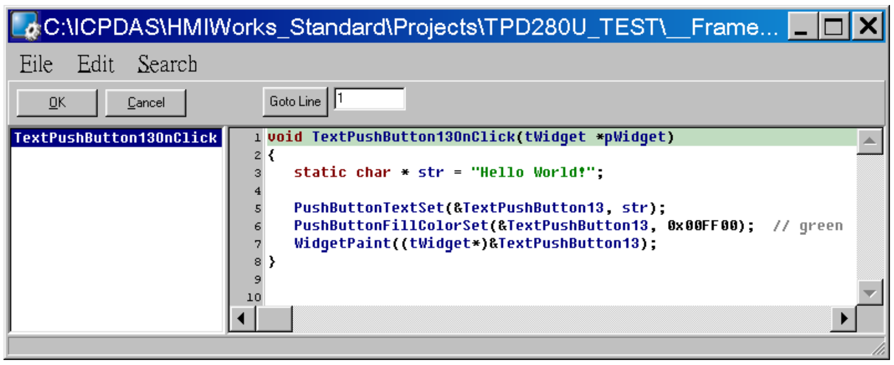
FillColor	0x00FF00
Font	(Font)
Height	51
ID	13
Left	43
Name	TextPushButton
OnClick	TextPushButton13...
OutlineColor	0x000000
PressFillColor	0x0000FF
Reference	
RefObject	
Text	Hello World!
Top	125
Width	161

7.2.1. FillColor and Text of a TextPushButton

This section shows how to change the “FillColor” and the “Text” properties of a TextPushButton component. Simply follow the steps below.

1. Click the TextPushButton icon in the “**Toolbox**” panel and move your mouse to the frame design area. Click and drag a suitable sized TextPushButton.

2. Double click the TextPushButton component to implement its OnClick event handler in the displayed programming window. Then press **OK** to save the file and leave.

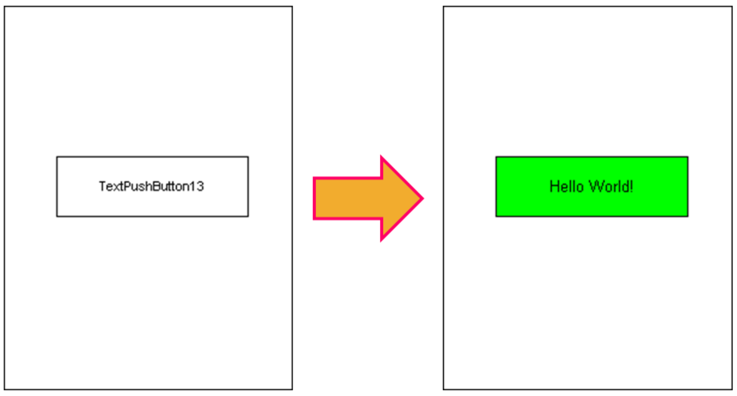

C:\ICPDAS\HMIWorks_Standard\Projects\TPD280U_TEST\__Frame...
File Edit Search
OK
Cancel
Goto Line
1
TextPushButton13OnClick

```
void TextPushButton13OnClick(tWidget *pWidget)
{
    static char * str = "Hello World!";

    PushButtonTextSet(&TextPushButton13, str);
    PushButtonFillColorSet(&TextPushButton13, 0x00FF00);  // green
    WidgetPaint((tWidget*)&TextPushButton13);
}
```

3. In order to make it clearer, we copy the above codes below.

```
void TextPushButton13OnClick(tWidget *pWidget)
{
        static char * str = "Hello World!";

        PushButtonTextSet(&TextPushButton13, str);
        PushButtonFillColorSet(&TextPushButton13, 0x00FF00);    // green
        WidgetPaint((tWidget*)&TextPushButton13);
}
```

The effect of the OnClick event handler:



To set the "Text" property of a TextPushButton, we provide another function "**TextButtonTextSet**" for your convenience. Refer to the API reference for more details. The API reference can be downloaded from:

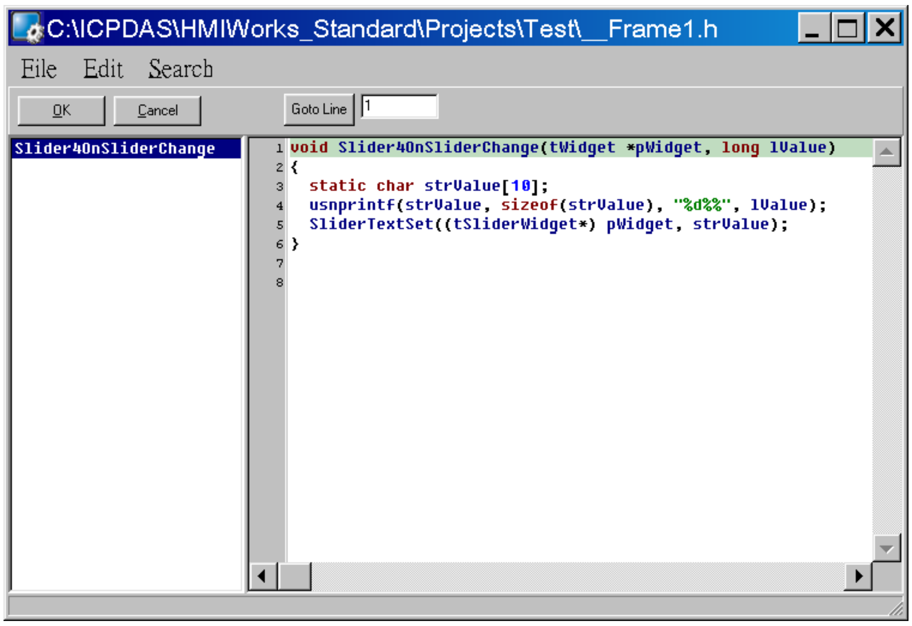
ftp://ftp.icpdas.com/pub/cd/touchpad/document/english/api_reference/

For more API functions of the TextPushButton component, refer to **pushbutton.h** in the following path: "C:\ICPDAS\HMIWorks_Standard\include\grlib", where "C:\ICPDAS\HMIWorks_Standard" is the installation path.

7.2.2. Percentage of a Slider

Simply follow the steps below to display the percentage of a Slider when it changes its position.

1. Click the Slider icon in the "**Toolbox**" panel and move your mouse to the frame design area. Click and drag a suitable sized Slider.
2. Double click the Slider component to implement its OnSliderChange event handler in the displayed programming window. Then press **OK** to save the file and leave.



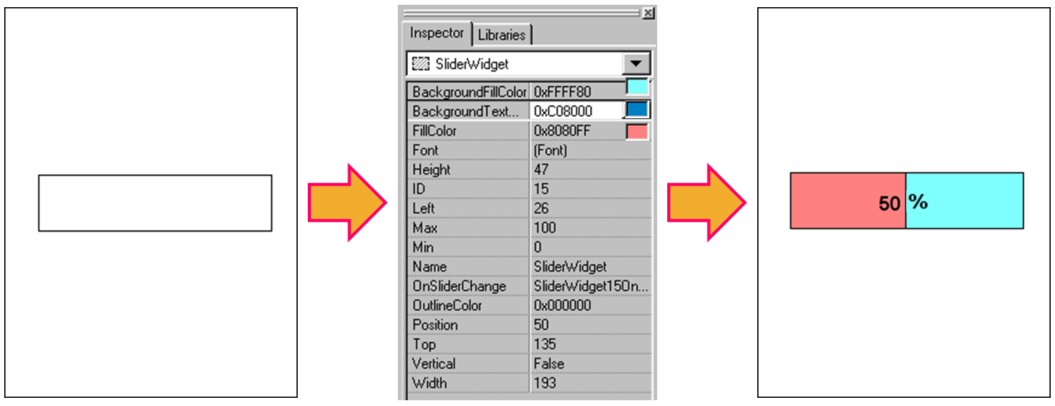
```
void Slider4OnSliderChange(tWidget *pWidget, long lValue)
{
  static char strValue[10];
  usnprintf(strValue, sizeof(strValue), "%d%%", lValue);
  SliderTextSet((tSliderWidget*) pWidget, strValue);
}
```

3. In order to make it clearer, we copy the above codes below.

```
void SliderWidget6OnSliderChange(tWidget *pWidget, long lValue)
{
    static char strValue[10];
```

```
        usnprintf(strValue, sizeof(strValue), "%d%%", lValue);
        SliderTextSet((tSliderWidget*) pWidget, strValue);
    }
```

The effect of the OnSliderChange function (after selecting colors):



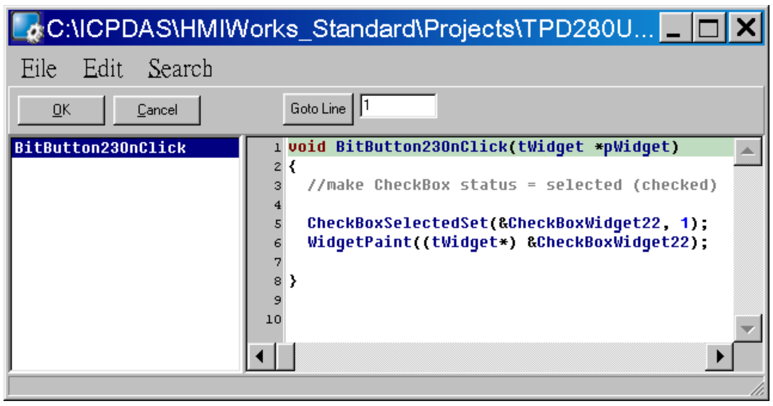
BackgroundFillColor	0xFFFF80
BackgroundText...	0xC08000
FillColor	0x8080FF
Font	(Font)
Height	47
ID	15
Left	26
Max	100
Min	0
Name	SliderWidget
OnSliderChange	SliderWidget15On...
OutlineColor	0x000000
Position	50
Top	135
Vertical	False
Width	193

For more API functions of Slider, refer to **slider.h** in the following path: "C:\ICPDAS\HMIWorks_Standard\include\grlib", where "C:\ICPDAS\HMIWorks_Standard" is the installation path.

7.2.3. Selected of a CheckBox

Take the steps below for example to change the "Selected" property of a CheckBox component in the run time.

1. Click the CheckBox icon in the "**Toolbox**" panel and move your mouse to the frame design area. Click and drag a suitable sized CheckBox.
2. Repeat the same procedure as that of the CheckBox component for a BitButton component.
3. Double click the BitButton component to implement its OnClick event handler in the displayed programming window. Then press **OK** to save the file and leave.

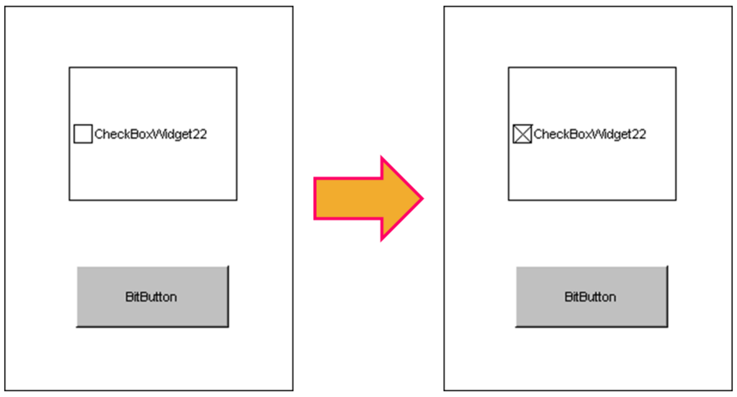


```
void BitButton23OnClick(tWidget *pWidget)
{
  //make CheckBox status = selected (checked)

  CheckBoxSelectedSet(&CheckBoxWidget22, 1);
  WidgetPaint((tWidget*) &CheckBoxWidget22);

}
```

4. In order to make it clearer, we copy the above codes below.

```
void BitButton23OnClick(tWidget *pWidget)
{
   //make CheckBox status = selected (checked)

   CheckBoxSelectedSet(&CheckBoxWidget22, 1);
   WidgetPaint((tWidget*) &CheckBoxWidget22);
}
```

The effect of the OnClick function:

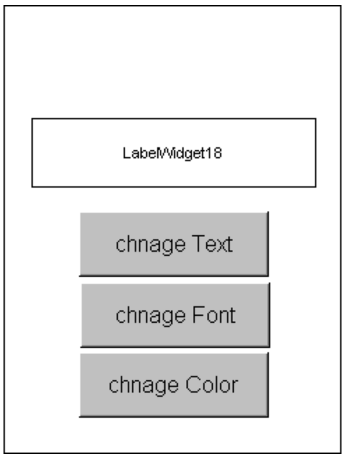


For more API functions of CheckBox, refer to **checkbox.h** in the following path:
"C:\ICPDAS\HMIWorks_Standard\include\grlib", where
"C:\ICPDAS\HMIWorks_Standard" is the installation path.

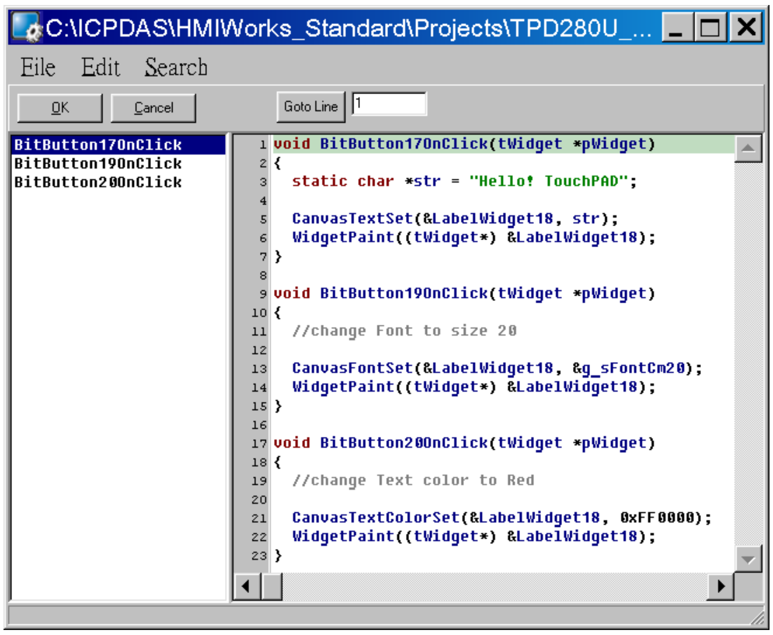
7.2.4. Font, Text and TextColor of a Label

Take the steps below for example to update properties of a Label component in the run time.

1. Click the Label icon in the "**Toolbox**" panel and move your mouse to the frame design area. Click and drag a suitable sized Label.
2. Repeat the same procedure as that of the Label component above for three BitButton components.



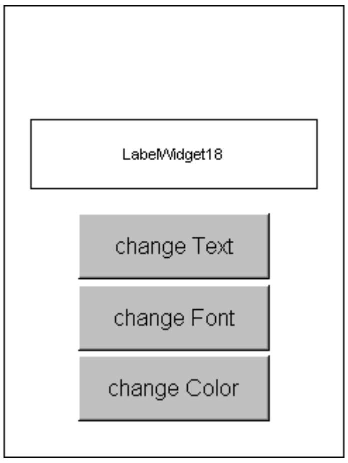
3. Double click the BitButton component to implement its OnClick event handler in the displayed programming window. Then press **OK** to save the file and leave.

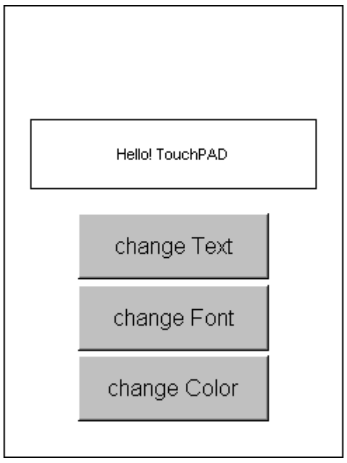


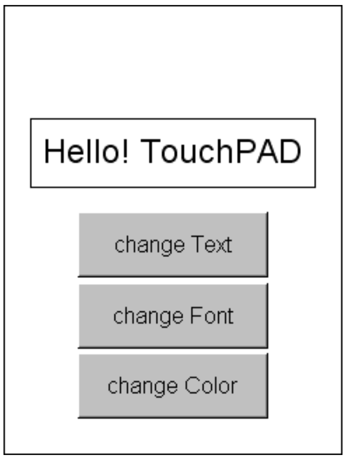
```
void BitButton17OnClick(tWidget *pWidget)
{
  static char *str = "Hello! TouchPAD";

  CanvasTextSet(&LabelWidget18, str);
  WidgetPaint((tWidget*) &LabelWidget18);
}

void BitButton19OnClick(tWidget *pWidget)
{
  //change Font to size 20

  CanvasFontSet(&LabelWidget18, &g_sFontCm20);
  WidgetPaint((tWidget*) &LabelWidget18);
}

void BitButton20OnClick(tWidget *pWidget)
{
  //change Text color to Red

  CanvasTextColorSet(&LabelWidget18, 0xFF0000);
  WidgetPaint((tWidget*) &LabelWidget18);
}
```

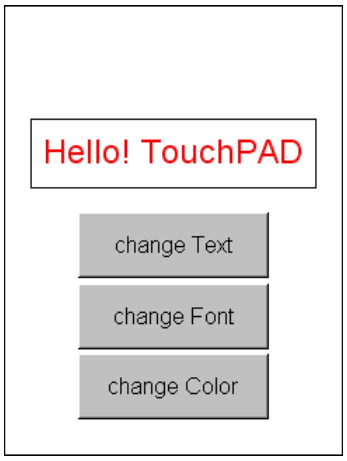
4. In order to make it clearer, we copy the codes below with their corresponding results.

Results	Codes of the event handler

	//step 0
	//the beginning snapshot
	N/A

 Hello! TouchPAD
change Text
change Font
change Color
	//step 1
	//Click on BitButton "change Text"
	
	void BitButton17OnClick(tWidget *pWidget)
	{
	    static char *str = "Hello! TouchPAD";
	
	    CanvasTextSet(&LabelWidget18, str);
	    WidgetPaint((tWidget*) &LabelWidget18);
	// or use **LabelTextSet** to replace
	// **CanvasTextSet** and **WidgetPaint**, that is:
	// **LabelTextSet**(&LabelWidget18, str);
	}

 Hello! TouchPAD
change Text
change Font
change Color
	//step 2
	//Click on BitButton "change Font"
	
	void BitButton19OnClick(tWidget *pWidget)
	{
	    //change Font to size 20
	
	    CanvasFontSet(&LabelWidget18,
	&g_sFontCm20);
	    WidgetPaint((tWidget*) &LabelWidget18);
	}



```
//step 3
//Click on BitButton “change Color”

void BitButton20OnClick(tWidget *pWidget)
{
   //change Text color to Red

   CanvasTextColorSet(&LabelWidget18,
0xFF0000);
   WidgetPaint((tWidget*) &LabelWidget18);
}
```

To set the “Text” property of a Label component, we provide another function “**LabelTextSet**” for your convenience. Refer to the API reference for more details. The API reference can be downloaded from:
ftp://ftp.icpdas.com/pub/cd/touchpad/document/english/api_reference/

For more API functions of Label, refer to **canvas.h** in the following path: “C:\ICPDAS\HMIWorks_Standard\include\grlib”, where “C:\ICPDAS\HMIWorks_Standard” is the installation path.

In the same path, there is a header file, grlib.h.
grlib.h contains prototypes for the pre-defined fonts, such as g_sFontCm20.

7.3. Accessing Tags in Ladder

In HMIWorks, users can design a project with many frames of two different types, “Standard C” and “Ladder”. The variables (tags) used in the Ladder is transformed into a structure of the C language after building the project and thus the tags can be accessed in the frame of programming type “Standard C”.

Two macros are provided for this purpose:
1. **VAR_GET**: get the value from the tag in the Ladder
2. **VAR_SET**: set a value to the tag in the Ladder

Supposed that we have a tag named “count” incremented in the Ladder, then we can get the value of the “count” tag and set the “count” tag to zero as shown in the example below.

```
static char str[32];

//get count (virtual tag) from Ladder
void TextPushButton8OnClick(tWidget *pWidget)
{
   VAR_GET(count);

   usprintf(str, "%d", count);
   LabelTextSet(&LabelWidget9, str);
}

//Set count to zero
void TextPushButton11OnClick(tWidget *pWidget)
{
   VAR_SET(count, 0);

   usprintf(str, "%d", count);
   LabelTextSet(&LabelWidget9, str);
}
```

Appendix

Appendix is listed below:

1. FAQ, Frequently Asked Questions

A.FAQ

A.1. What to do if screen flashes?

Go to the section "Properties of a Frame" for details.

A.2. How to have higher-resolution Picture?

Go to the section "Loading a Picture" for details.

A.3. How does a TouchPAD control I/O?

Go to the section "Using an ObjectList" for details.

A.4. How to change Font of Text?

Go to the section "Drawing a Text" for details.

A.5. How to represent decimals for Ladder Designer?

Go to the section “Using a Label” for details.

A.6. How to remove the startup beep of a TPD-283 device?

The TPD-283 devices sound a beep when startup.
Refer to the section “The Options of TouchPAD” for more details.

A.7. How to customize the generated code?

Every time when building a project, HMIWorks generates source codes to build. Below is the procedure to customize the generated source codes.

1. After finishing designing the project, press **F5** (build) on your keyboard instead of **F9** (run) to generate codes.
2. In the directory of the project, open the source file (.c files).
3. Edit the source files (.c files).
4. Press **F10** on your keyboard, and a “cmd.exe” window is displayed. Enter “make” in the “cmd.exe” window to re-make the project.
5. Click the “**Download Only** (**Ctrl** + **F9**)” option from the “**Run**” menu to download the .bin (or .bix) file.

A.8. How to store data in the flash?

For users' convenience, there are two sets of API functions for data storage in the flash on the TouchPAD devices. One is for the MCU (micro-controller unit) internal flash and the other is the external serial flash.
To user these features, install the HMIWorks software with version 2.03 or above.
ftp://ftp.icpdas.com/pub/cd/touchpad/setup/

No.	1	2
Target Flash	MCU internal flash	External serial flash
Possible Target Device	All devices in the TouchPAD series	All devices in the TouchPAD series, except TPD-280 and TPD-283 (for those having external flash)
API Functions Provided*	hmi_UserParamsGet, hmi_UserParamsSet	hmi_UserFlashReadEx, hmi_UserFlashWriteEx, hmi_UserFlashConfig, hmi_UserFlashErase
Size of Storage	256 byte	4 KB ~ 7 MB
Suggested Users	Any TouchPAD users	**For advanced users only.** Any undetermined use will damage the application image.

* Refer to the API reference for more details.
ftp://ftp.icpdas.com/pub/cd/touchpad/document/english/api_reference/

A.9. How to clear a PaintBox?

Go to the section "Using a PaintBox" for details.