



## H0U series PLC with built-in HMI

## HMI display programming manual



User Guide

A00

Data code XXXXXX

## Preface

Thank you for purchasing H0U-XP programmable controller developed and produced by Inovance! H0U-XP programmable controller (hereinafter referred to as H0U-XP) includes two programming parts: logic (PLC) and text (TOD). The logic (PLC) programming software is AutoShop software, and the text (TOD) programming software is HTodEditor software. Both are developed and issued by Inovance. The user can realize the logic (PLC) or text (TOD) program control of H0U-XP by using the corresponding programming software.

You are welcome to visit Inovance's official website <http://www.inovance.com> and download AutoShop, HTodEditor software and the latest version of this manual.

[Note]: Except for "1 Programming Software and Installation" which involves the introduction of logic (PLC) programming software AutoShop, the rest of the chapters are mainly introductions to the use of text (TOD) programming software HTodEditor.

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# 1 Programming software and its installation

## 1.1 Installation and use of logic programming software AutoShop

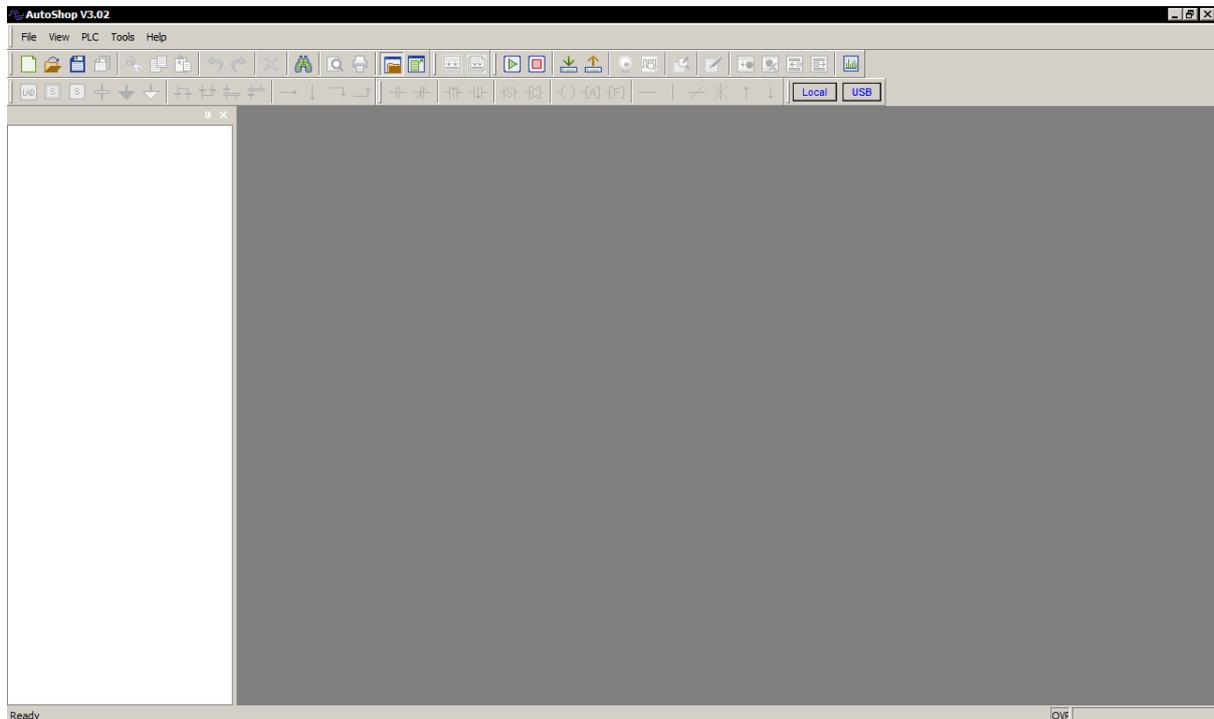
### 1) Acquisition of AutoShop software

Visit Inovance's official website <http://www.inovance.com>, download the latest version of AutoShop software, and save it to your local computer.

- 2) Installation: follow the installation prompts to complete the software installation
- 3) Start

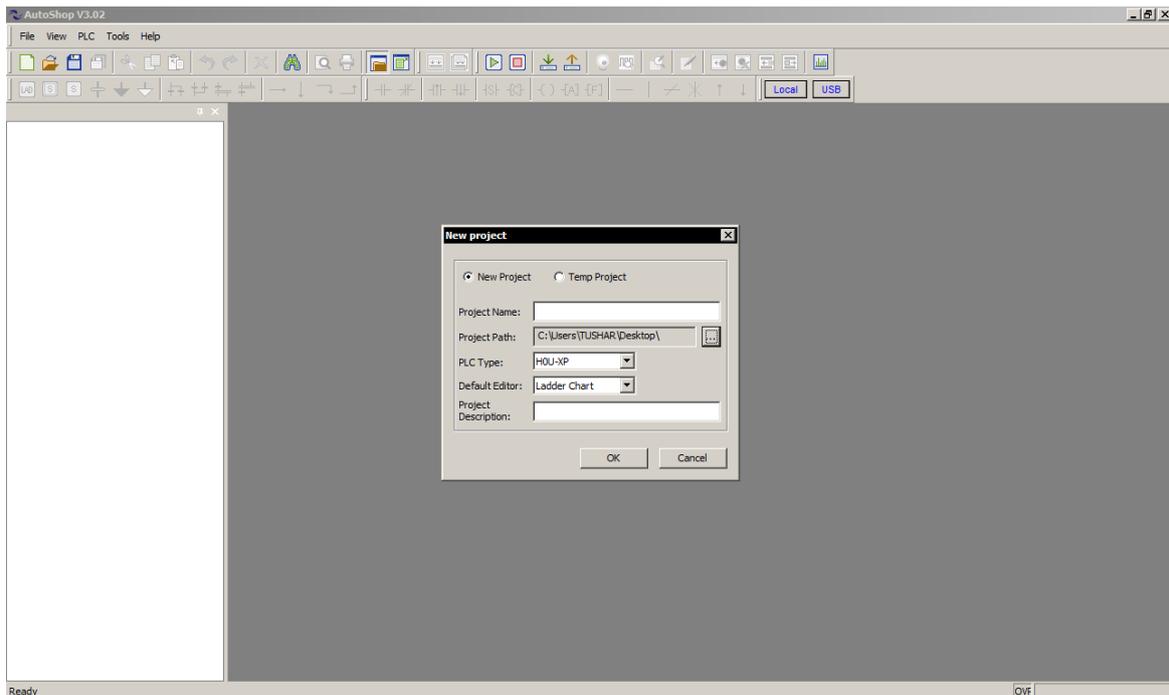


After AutoShop is installed correctly, click the AutoShop icon from the start menu or on the system desktop to start the software. The main interface is as shown in the figure:

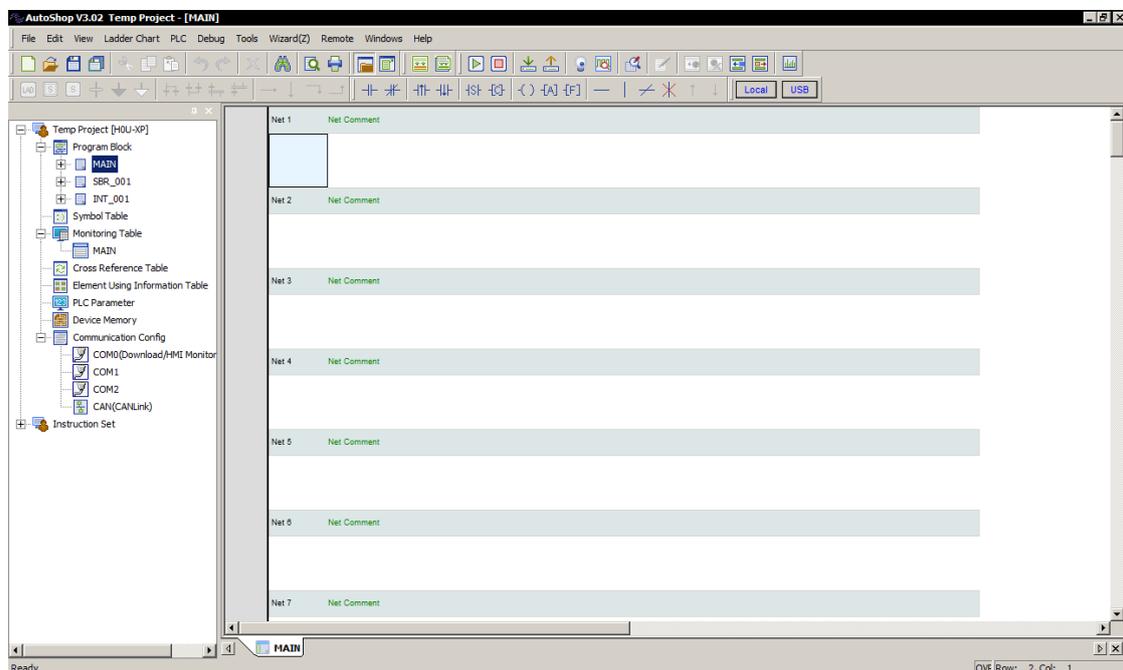


### 4) Build the project

After starting the programming environment, you first need to create a project for programming. Click the "New Project" menu item under the "File" menu, and the software will pop up the following dialog box:



In this example, there are two modes, new project and temporary project can be selected, the PLC type is selected as "H0U-XP", and the default editor is ladder diagram. After the selection is completed, click the "OK" button in the dialog box, a new project is created, and the main program is opened by default to enter the program programming state, as shown in the following figure:



※ For more information about the operation guidance of AutoShop software, please refer to the "Help" of AutoShop software and the "Inovance H1U\H2U PLC Instruction and Programming Manual" separately issued by Inovance.

The following contents of this manual mainly introduce the general use of H0U-XP's text (TOD) programming software HTodEditor, including software installation instructions, quick start, parameter setting and display, control introduction, page generation, example demonstration, etc.

## 1.2 Installation of text programming software HTodEditor

### 1) Introduction to HTodEditor software

HTodEditor software is mainly used for text editing of H0U-XP series PLC (H0U integrated programmable controller), with text display, key setting, register setting, menu, bar graph, trend graph production, and alarm list display functions. Based on standard text functions, easy-to-use functions such as password authority and PLC control are added.

### 2) Install HTodEditor programming software

#### ▪ Software source

The HTodEditor programming software is independently developed by Inovance. You can ask for the latest version of the software from the supplier, or download it on the Inovance website:

<http://www.inovance.com>

Computer configuration requirements (recommended configuration)

- CPU: Intel or AMD products with a frequency above 1G
- Memory: 512MB or above
- Hard disk: at least 500MB free disk space
- Display: Support a colour display with a resolution of 1024 x 768 or higher
- Ethernet port or USB port: used when uploading and downloading page configuration programs
- Operating system: Windows 7/Windows 8/Windows 10

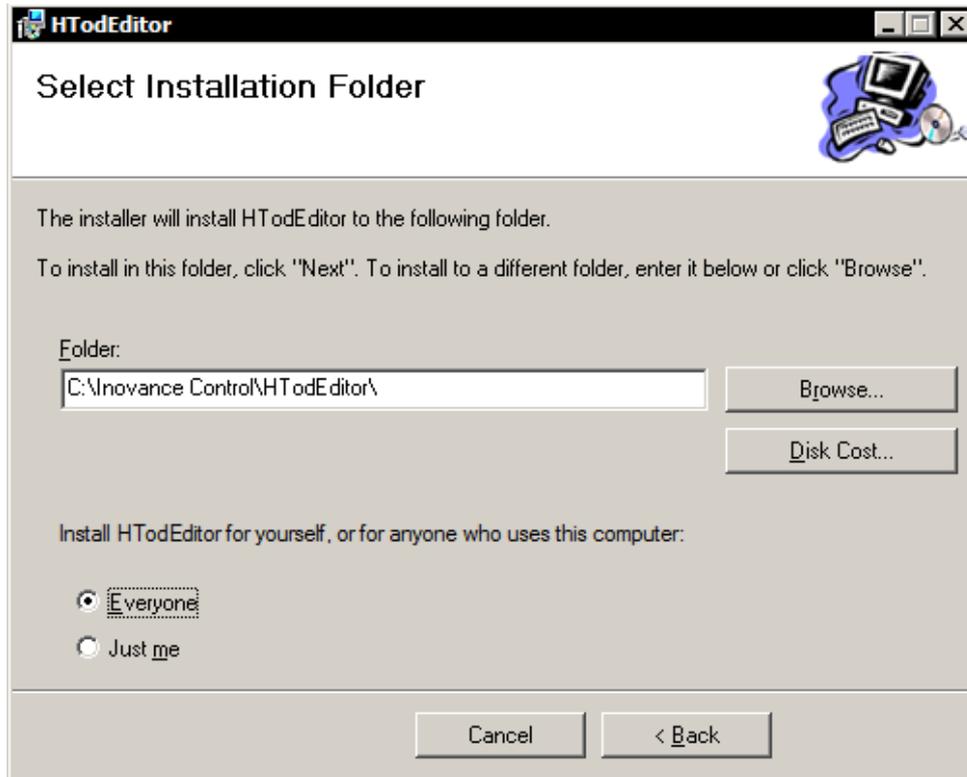
### 3) Installation steps



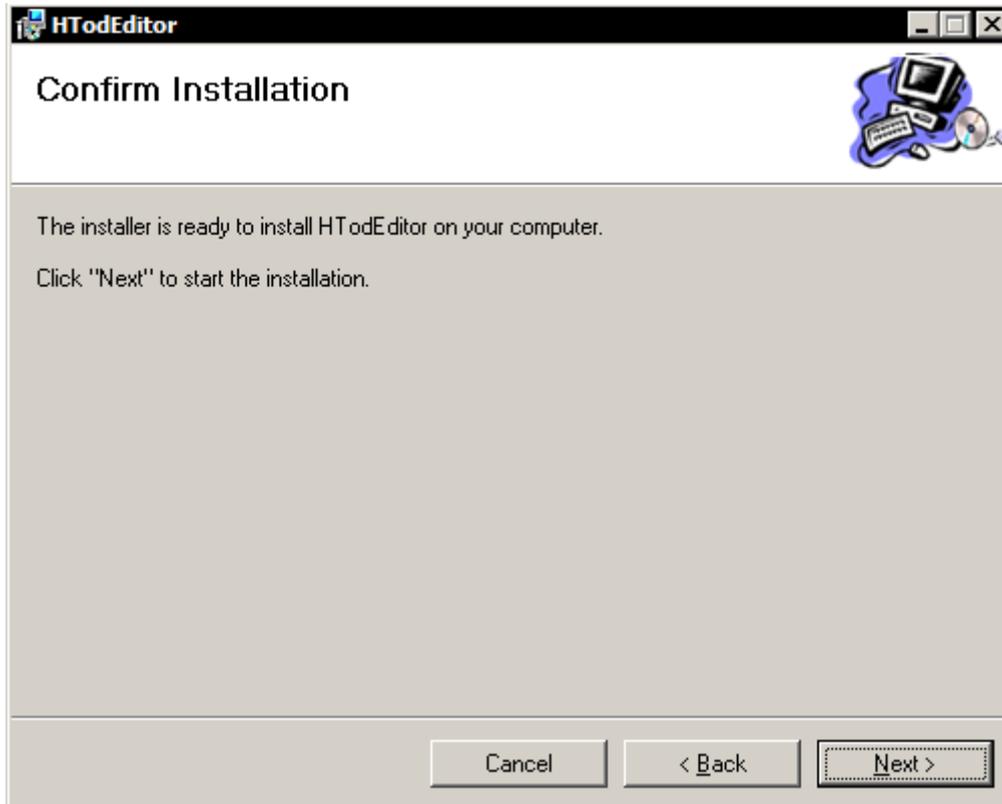
Step 1: Download the software to the computer, click the  [setup.exe] file, the screen will display the installation window as follows, at this time, according to the instructions, click "Next":

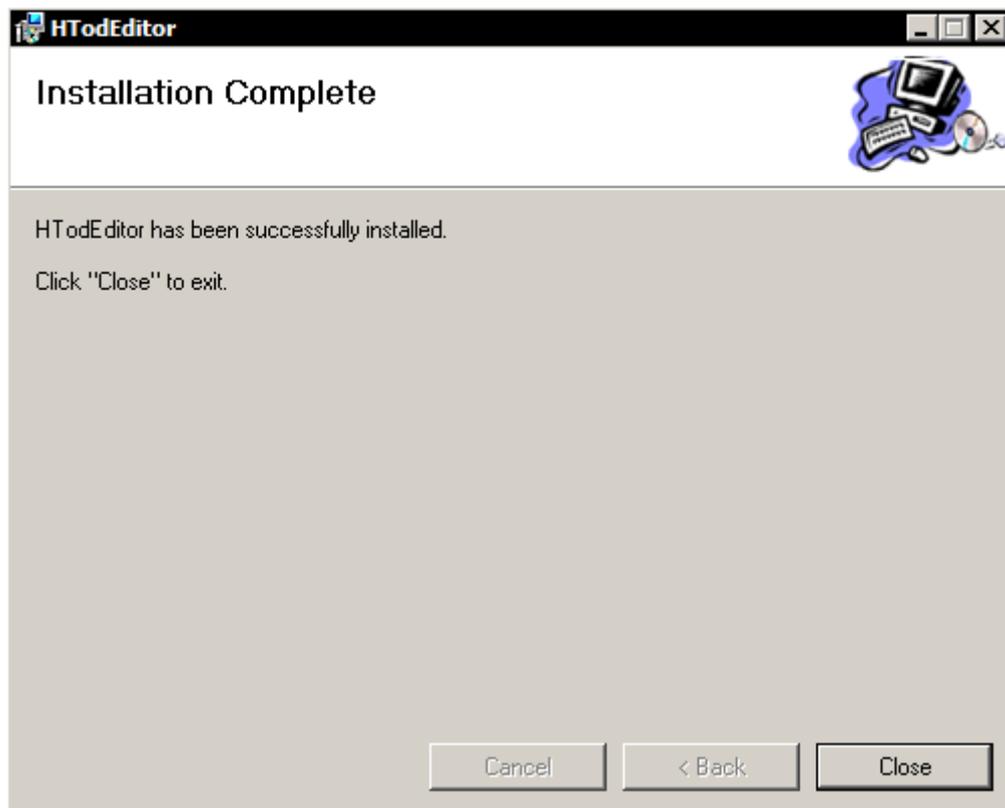
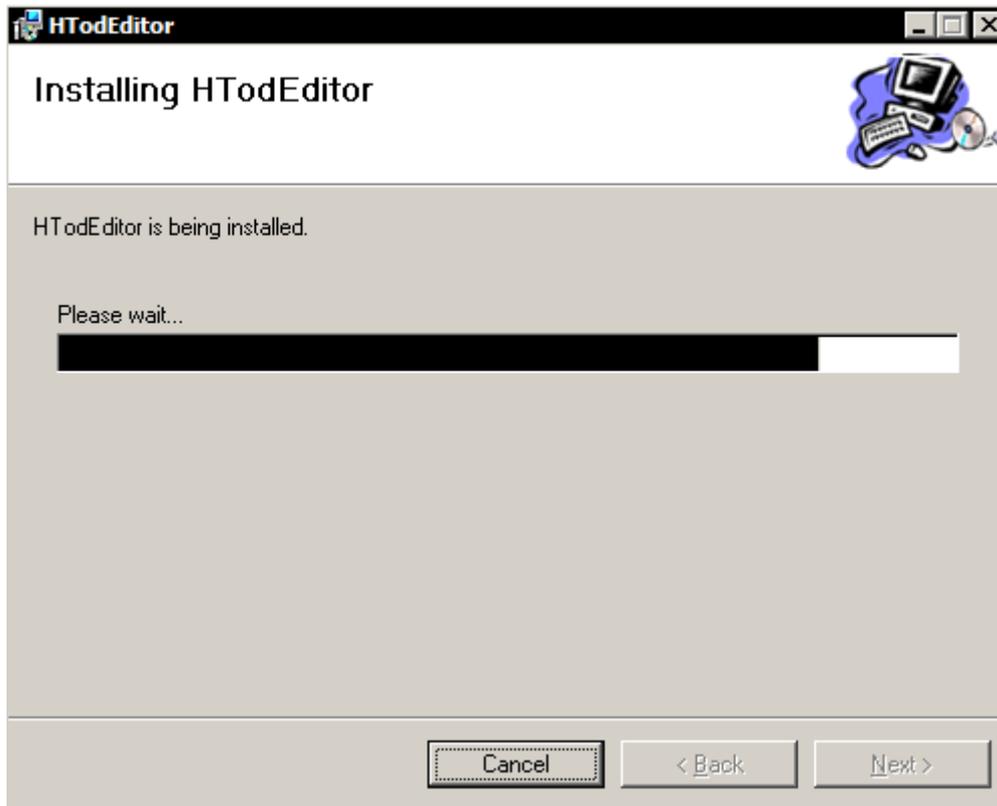


Step 2: Select the folder where the software to be installed or choose the default path, and click "Next":



Step 3: According to the instructions, click "Next" to confirm the installation. After the installation is complete, click "Close" to complete the installation process.





Step 4: When you want to execute the program, you can click  on the desktop; or you can find the corresponding execution program under the menu [Start]/[Programs]/[Inovance Control].

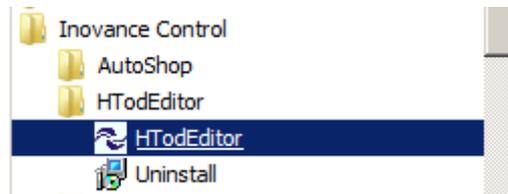


The meaning of each option in the software menu is as follows:

HTodEditor	Programming software
Uninstall	Uninstall software

## 2 Quick start

After the installation is complete, click  on the desktop; or find the corresponding executable program under the menu [Start]/[Programs]/[Inovance Control]. As shown in the figure below, click HTodEditor to enter the programming interface of HTodEditor software.

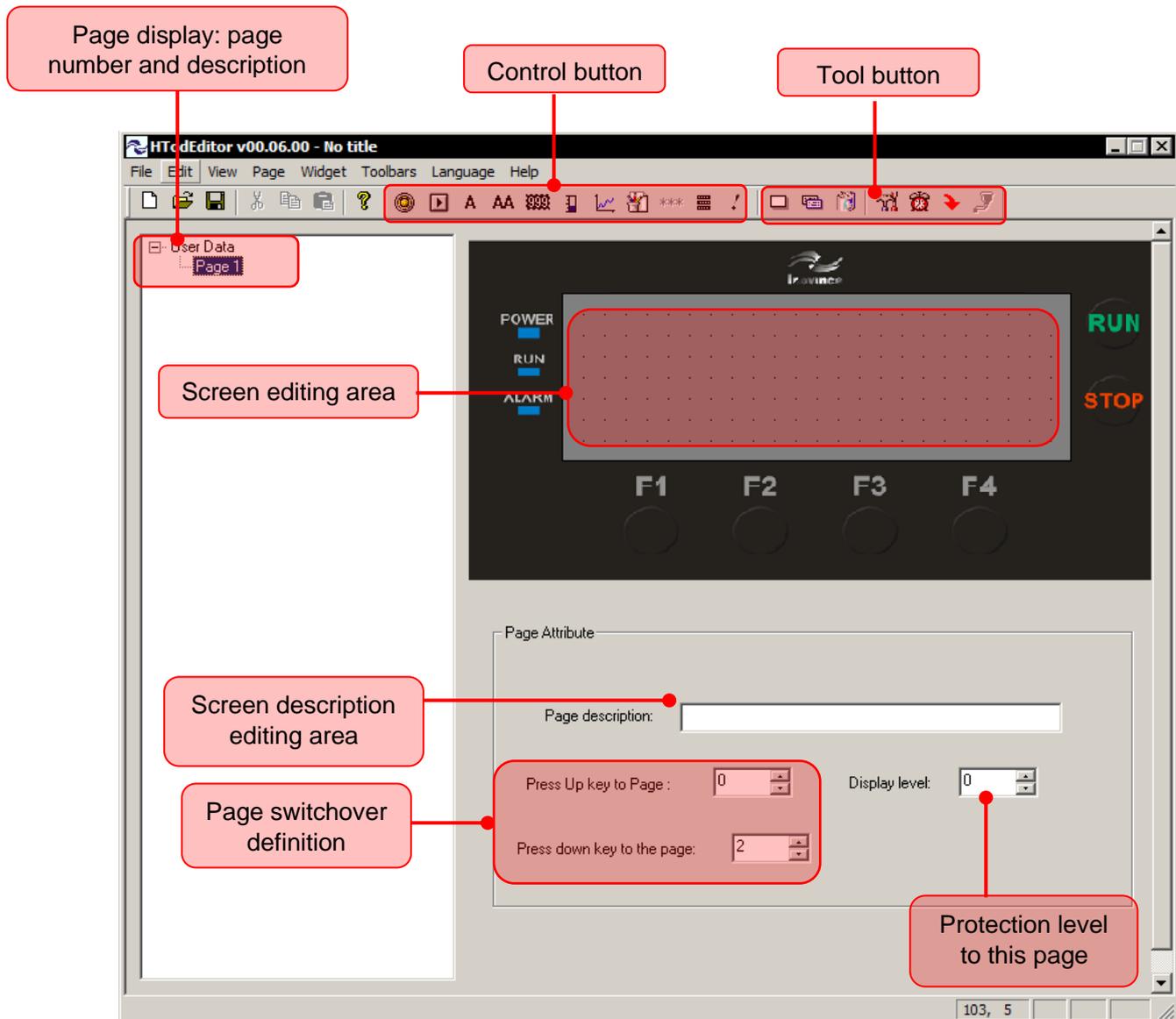


## 2.1 Structure layout of page editing software

A project is developed based on pages. Each page completes some specific functions and can switch over to any other pages.

After opening the project, the user can create or open a page. Elements such as text, indicator lights, switches, data display setting windows, and jump keys can be placed on each page. The pages can switchover, and the operator can complete data monitoring, parameter setting, switch control, alarm list monitoring and other operations.

The structure layout of the HTodEditor software after opening is shown in the figure below.

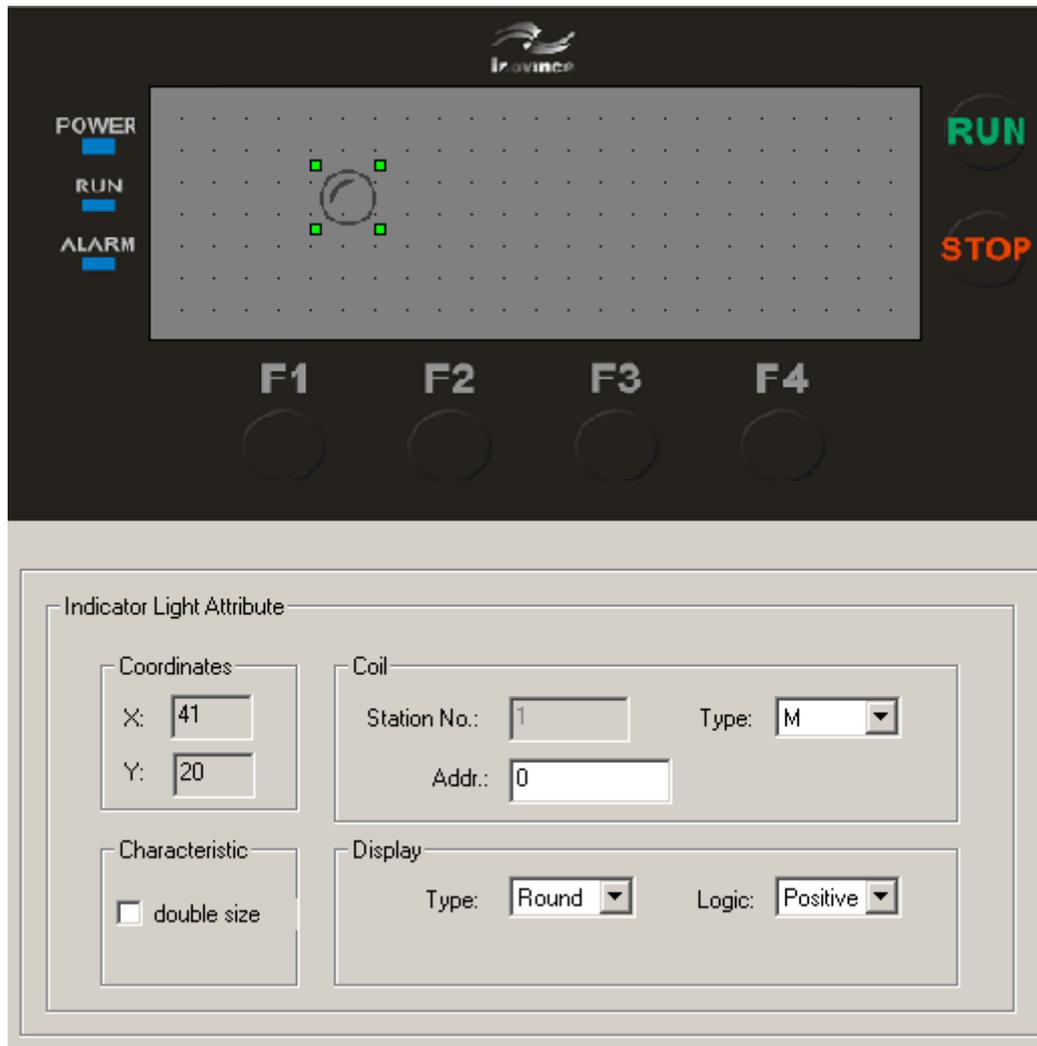


Page editing area: a snap grid is displayed in the display area. The distance between the top, bottom, left, and right of the black dots is 16 pixels, and the entire page is a 192x64 pixels matrix. When the designer places or moves the controls, he refers to the location of the adjacent dots to facilitate the alignment of the controls. When the designer uses the mouse to drag the control to move, the distance of each movement is an integer multiple of 4 pixels.

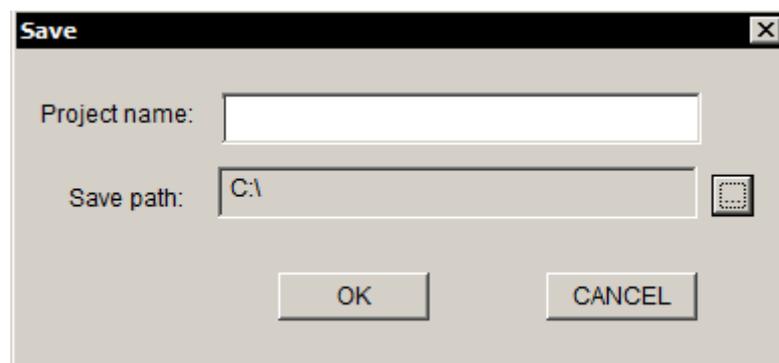
## 2.2 Make a simple project

Step 1: First press the "New Project"  button on the toolbar. To add an "indicator" control, click  on control button (indicator) in the window to complete the control creation. Enter the attribute editing interface to edit "Indicator Attributes".

As shown below:



Step 2: Click the  icon to pop up the following dialog box, please enter the project name and save the file.



Step 3: Download the page configuration to the H0U integrated programmable controller. Click the  tool button (file download), the following dialog box will pop up, and click "download".



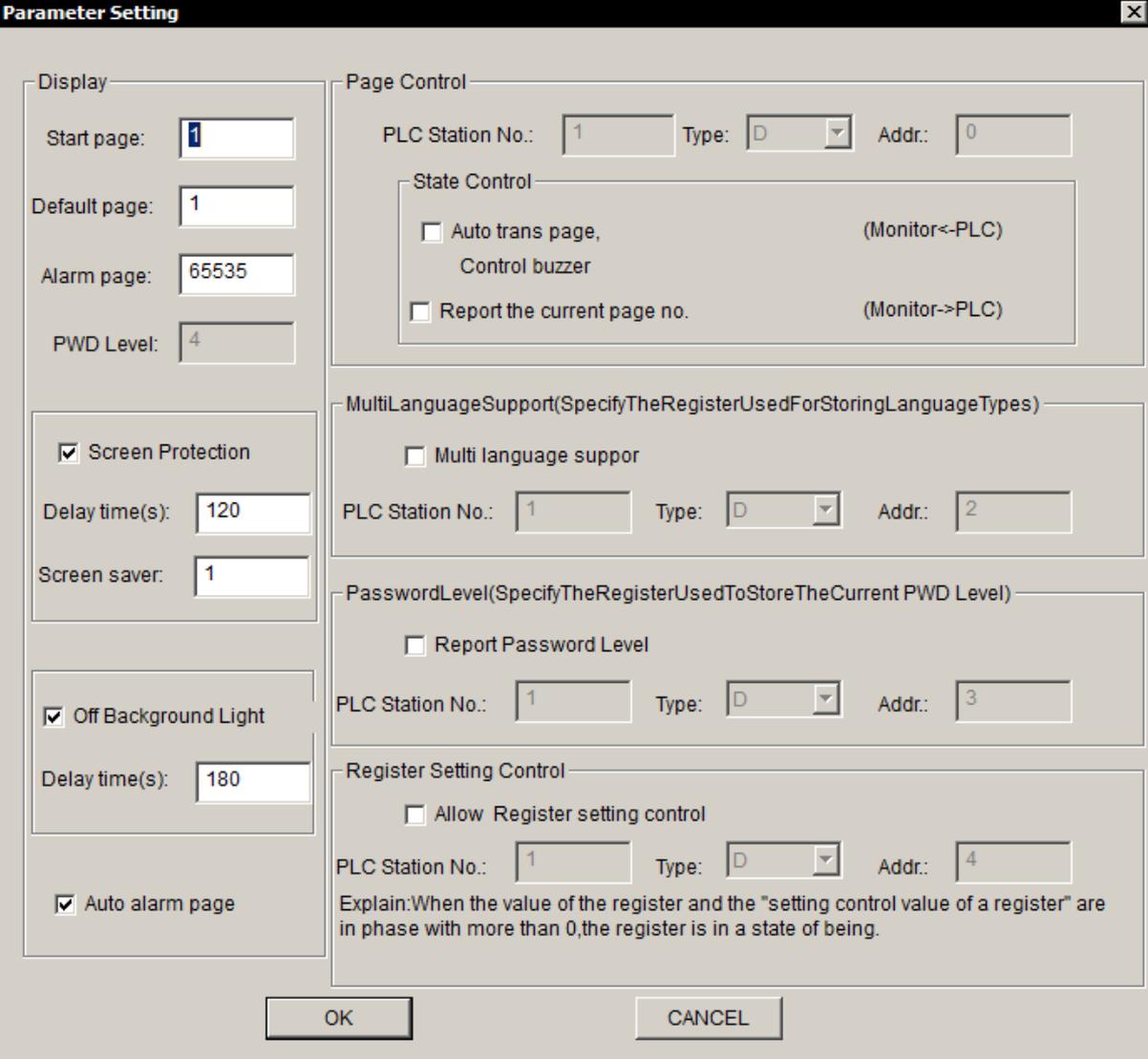
After the file is downloaded successfully, "File download complete" will be displayed on the interface; if the download is unsuccessful, it will display "Connecting device...Failed".

## 3 Parameter setting and display

### 3.1 Parameter setting

Open the "Tools/Parameter Settings" of the HTodEditor software menu, or click the tool button

 (parameter settings) to enter the following parameter setting interface, which can set some parameters of project.



**Parameter Setting**

**Display**

Start page:

Default page:

Alarm page:

PWD Level:

Screen Protection

Delay time(s):

Screen saver:

Off Background Light

Delay time(s):

Auto alarm page

**Page Control**

PLC Station No.:  Type:  Addr.:

**State Control**

Auto trans page, (Monitor-<PLC)  
Control buzzer

Report the current page no. (Monitor->PLC)

**MultiLanguageSupport(SpecifyTheRegisterUsedForStoringLanguageTypes)**

Multi language suppor

PLC Station No.:  Type:  Addr.:

**PasswordLevel(SpecifyTheRegisterUsedToStoreTheCurrent PWD Level)**

Report Password Level

PLC Station No.:  Type:  Addr.:

**Register Setting Control**

Allow Register setting control

PLC Station No.:  Type:  Addr.:

Explain:When the value of the register and the "setting control value of a register" are in phase with more than 0,the register is in a state of being.

OK CANCEL

### 3.2 Display parameters

Parameter type	Parameter description
Start page	Used to define the page displayed after power-on, generally used to display the welcome page.
Default page	Used to set the default display page. When the ESC button has no special function, press the ESC button to jump to the default page.
Alarm page	After defining this page, once there is an alarm message, it will automatically jump to this page. Related to the alarm list, the alarm list definition variable will jump to this page when an alarm occurs. If the alarm page has been edited, it will jump to this page when an alarm occurs. If the alarm page is 65535, jumps to the default alarm page when an alarm occurs. Note: If the set alarm page has not been edited, it will also jump to the default alarm page when an alarm occurs.
Password level	This software defines the highest level 4 password.
Screen saver	It is used to set the time of no key operation and the screen saver page. After this time, it will automatically jump to the screen saver page.
Turn off the backlight	It is used to turn off the LCD backlight after the time of no key operation.
Auto alarm page	Used to define whether to jump to the alarm page when an alarm sign appears. For the definition of alarm sign, see "3.1 Parameter Setting- <input checked="" type="checkbox"/> Auto alarm page .

#### 1) Page control

The page control function is to associate the interface number of the text with the data register of the PLC. If you need this function, you first need to check the relevant options of status control, and then set the D component address related to the text. Take D0 as the associated variable as an example, as shown in the figure below:

When the D0 component data of the PLC changes, the page of the text also changes to the page indicated by D0.

Page Control

PLC Station No.:  Type:  Addr.:

State Control

Auto trans page, Corresponding to D0 (Monitor<-PLC)

Control buzzer Corresponding to

Report the current page no. (Monitor->PLC)

When the text page changes, the D1 element of the PLC will be converted into page number data accordingly

#### 2) Multi-language support

At present, the H0U integrated programmable controller only supports two languages, Chinese and English. Set the switch between Chinese and English by storing language register under parameter setting. When the storage language register is set to 0 text, the content of Language 1

is displayed; when the storage language register is set to non-zero text, the content of Language 2 is displayed.

### 3) Report password level

If the Report password level option is checked, the current password level will be displayed in the associated PLC register. (this software defines the highest level 4 password)

### 4) Register setting control

If you check to allow register setting control, when the value of the lower eight bits of this register and the "setting control value" of a certain register are more than 0, the register is in a settable state. For details, see the section "4.4 Registers" below.

#### ▪ Page attributes

- First enter the editing state of the initial page of the system (the default page is 1). The lower left corner of the interface is the attributes of the current editing page (page 1), each page has attributes, as shown in the following figure.

Page description	Describe the nature of the page, which is convenient for the designer to manage. It only serves as a reminder and can be omitted. For example, enter "Main Menu".
Press Up key to page	After setting a specific page number, press the up key [▲] on the current page of the display, and the display will jump to the page pointed to by the page number.
Press down key to the page	After setting a specific page number, press the up key [▼] on the current page of the display, and the display will jump to the page pointed to by the page number.

When the display is running, pressing [ESC] key, [▲] key or [▼] key is the simplest way to switch pages. In addition, the page jump can also be realized by setting the function keys.

Note:

- If the [▲] key or [▼] key of the current page is set as a function key, the page jump parameter in this page has no effect.
- If the page specified by the [▲] key or [▼] key does not exist, the actual jump page number will be extended upwards or downwards in sequence until it reaches 0.
- If the page contains data setting controls, during the data setting process, the [▲] key or [▼] key performs the value increase and decrease functions. After exiting the value setting state, the [▲] key or [▼] key recover the page jump function.

## 4 Controls

HTodEditor provides 10 kinds of controls such as indicator light, button, static text, dynamic text, register, bar graph, trend graph, picture, menu, alarm, etc. The functions of these controls are described as follows:

Control	Control name	Description
	Indicator light	Display the on-off status of the intermediate relay in the PLC.
	Function keys	The 8 keys at the bottom of MD204L and the other 12 numeric keys can all be defined as function keys. The functions of the function keys include screen jump and switch control.
	Static text	Enter text, including Chinese characters or English letters.
	Dynamic text	Make dynamic text, and the text content can be switched by PLC register control.
	Register	Data monitoring or data setting components can be placed (operating objects are PLC data registers).
	Bar graph	The register data can be reflected on the bar graph.
	Trend	The register data can be displayed in the text as a trend graph.
	Picture	Use picture, you can insert monochrome BMP picture to the page. (note that the control size should be less than 192x64 pixels)
	Menu	The register data can be displayed through the menu.
	Alarm	The register can be associated with the alarm list to realize the alarm prompt.

#### 4.1 Static text

Click the  control button, a rectangular dashed frame appears on the screen, and follow the mouse to move, the moving distance is an integer multiple of 4 pixels, now click the left mouse button to confirm the position, after confirmation, the content "TextStr" is displayed on screen, and the static text attributes are displayed at the bottom of the interface:

Coordinate	The X value indicates the horizontal position of the text.	
	The Y value indicates the vertical position of the text.	
	The origin of the coordinates is at the upper left corner of the entire page.	
Characteristic	Double size	Both the horizontal and vertical text display are doubled.
	Inverted	The text and background colours are displayed inverted.
	Border	Add a rectangular frame around the text.
	Virtual	The text shows a semi-transparent state.
	Flashing	Flashes at the specified time interval, and the interval time is related to the program scan time.
Text	The actual displayed content can be directly input Chinese characters or English letters through various Chinese character input methods. The content of this column can be cut, copied or pasted.	

For example: double size, inverted text "Main Menu". Enter "Main Menu" in the setting column, and select the double size and inverted check boxes, the effect is shown in the figure below.

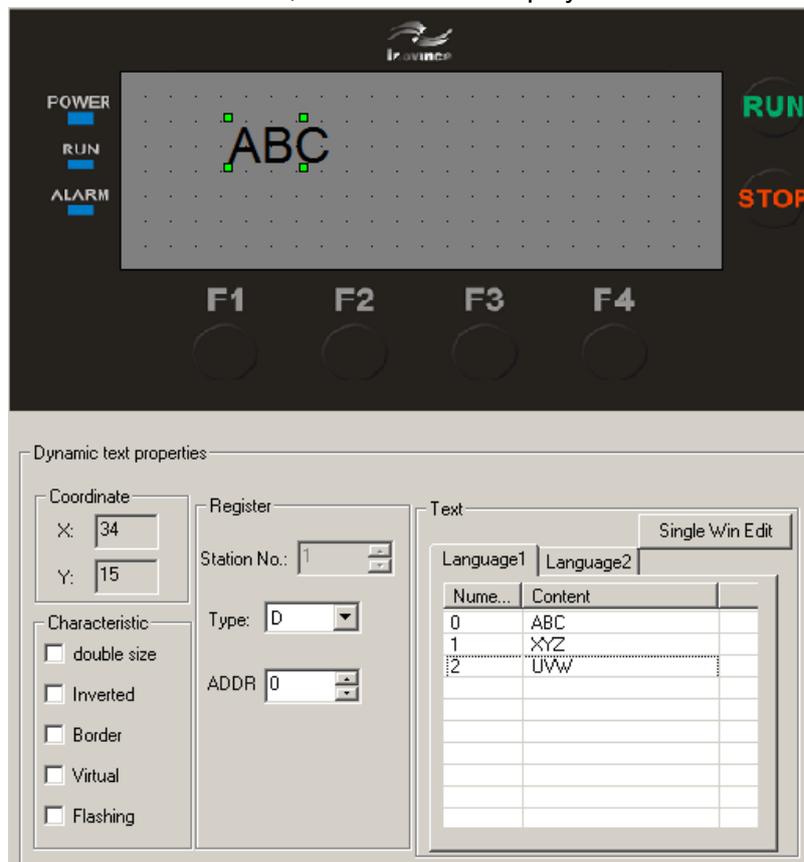


## 4.2 Dynamic text

Click the  control button, a rectangular dashed frame appears on the screen, and follow the mouse to move, the moving distance is an integer multiple of 4 pixels, now click the left mouse button to confirm the position, after confirmation, the content "DynamicStr" is displayed in the form, and the properties of the dynamic text are displayed at the bottom of the interface:

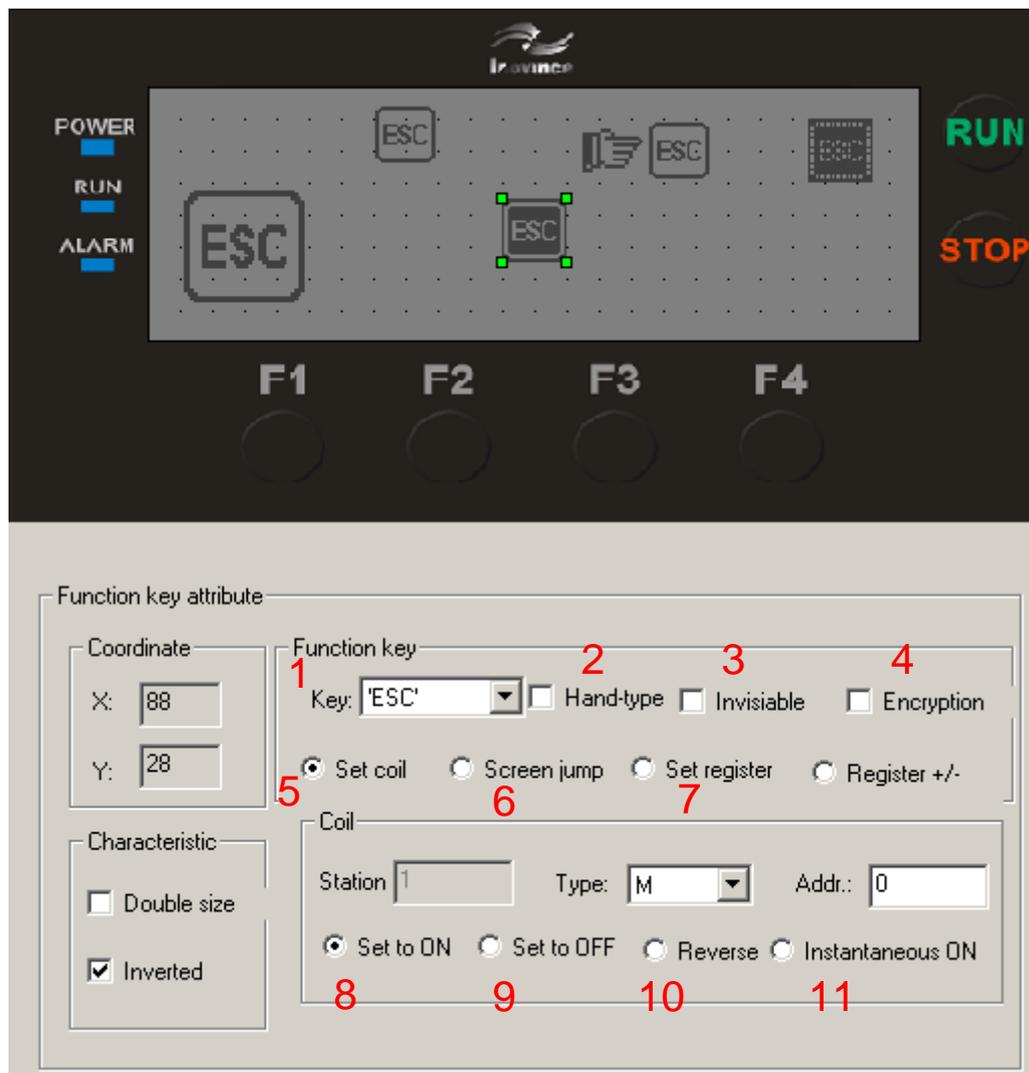
Coordinate	The X value indicates the horizontal position of the text.	
	The Y value indicates the vertical position of the text.	
	The origin of the coordinates is at the upper left corner of the entire page.	
Characteristic	Double size	Both the horizontal and vertical text display are doubled.
	Inverted	The text and background colours are displayed inverted.
	Border	Add a rectangular frame around the text.
	Virtual	The text shows a semi-transparent state.
	Flashing	Flashes at the specified time interval, and the interval time is related to the program scan time.
Register	PLC data register used to control the state switching of dynamic text. HEX/BCD: Display the data in the register in hexadecimal form. Decimal: Display the data in the register in decimal form.	
Text	Edit the content and data of dynamic text. The dynamic text control can set up to 32 groups of data. When importing data through the single edit serial port, if the data is greater than 32 groups, only the first 32 groups of data are valid.	

For example, when the register D0 is equal to 0, it will display "ABC" (as shown in the figure below), when D0 is equal to 1, it will display "XYZ", and when D0 is equal to 2, it will display "UVW". When D0 is not these three data, the screen will display blank.



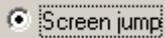
### 4.3 Function keys

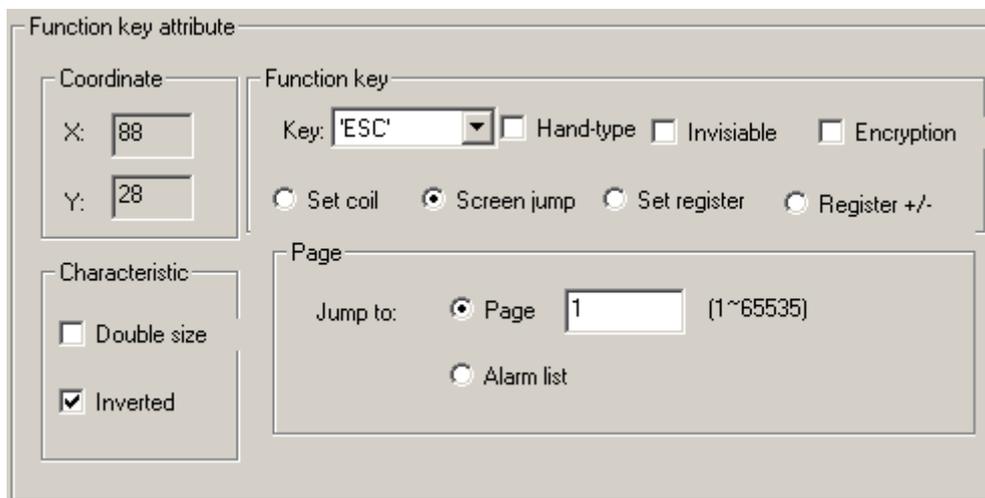
Click the  control button, a rectangular dashed frame appears on the screen, and follow the mouse to move, the moving distance is an integer multiple of 4 pixels, now click the left mouse button to confirm the position. After confirmation, the function key  "ESC" is displayed in the window, and the function key properties are displayed at the bottom of the interface, including "coordinates" and "characteristics" is consistent with the text attribute, used to indicate the position, determine the size of the figure and the inverted option.



SN	Function key	Description
1	Key	Choose the appropriate button from 25 buttons.
2	Hand-type	In order to facilitate the user to operate accurately and quickly, a hand symbol is added in front of the key symbol to indicate that an action can be completed by pressing the designated key. If you want to save space, you don't need to choose the hand shape.
3	Invisible	The user can choose not to display the button graphics on the screen, but the function of the button still exists.

4	Encryption	Encryption encrypts this function key, and this function key can only be used when the system password is open (has been set correctly).
5	Set coil	The action of this function key is the switch value setting.
6	Screen jump	The action of this function key is screen jump.
7	Set register	When this action of the function key used, PLC data register determines the corresponding switch action.
8	Set to ON	Turn on the designated intermediate relay.
9	Set to OFF	Turn off the designated intermediate relay.
10	Reverse	Set the designated intermediate relay to inverse logic.
11	Instantaneous ON	When the button is pressed, the designated intermediate relay is turned ON; when the button is popped up, the designated intermediate relay is turned OFF.

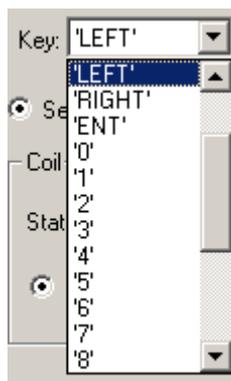
If you select  "Screen Jump", the following setting dialog will appear:

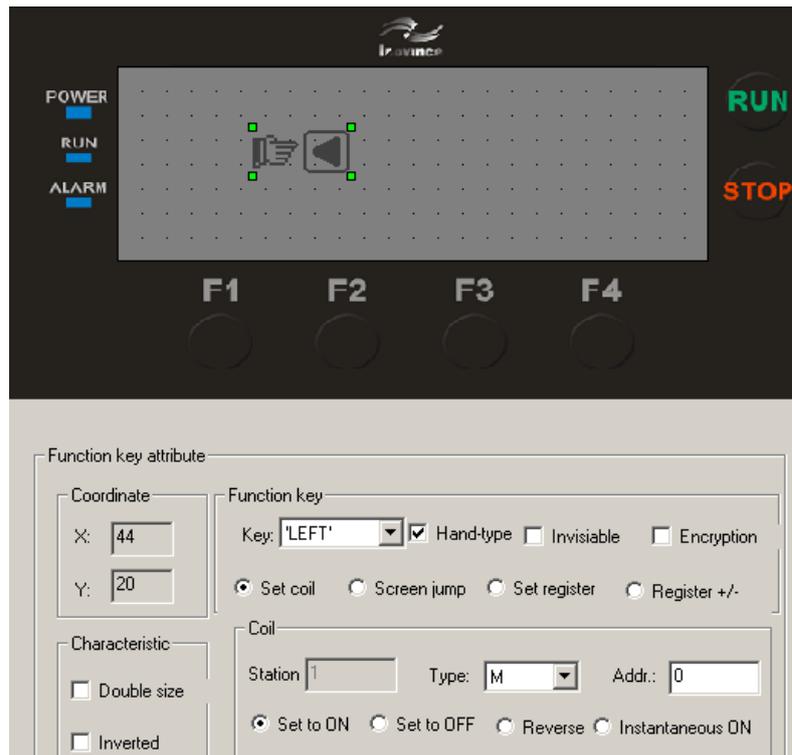


In above example, under 'Function key attribute, set the "Jump to" page number to 2. When 'Esc' key is pressed, jumps to page number 2.

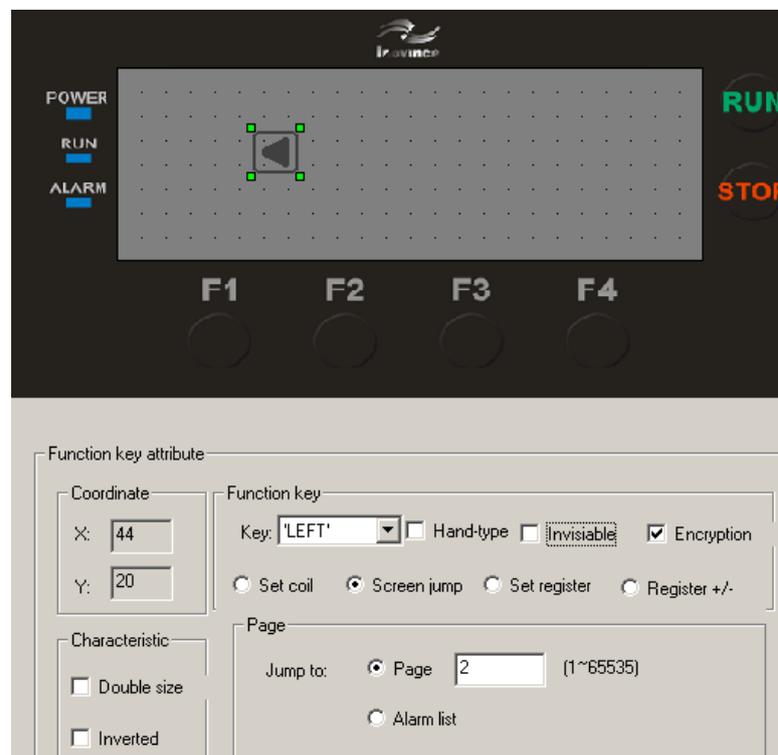
Setting registers and register addition and subtraction functions are similar to setting coil functions.

Click the  button drop-down dialog box, and 25 button markers will pop up, select the button you need.





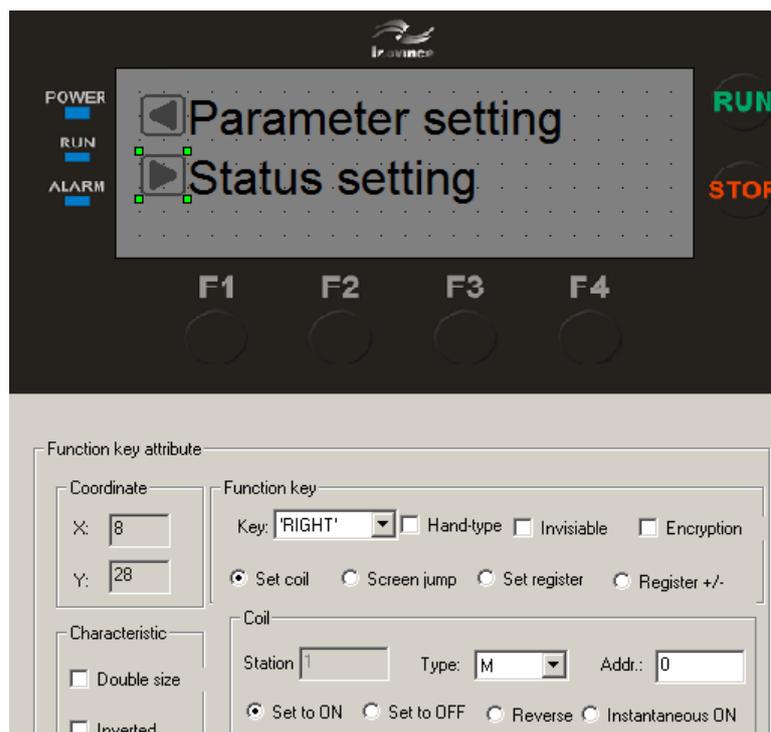
If you want to save space, you can cancel the  Hand-type "hand shape" display, and only the button shape is displayed on the screen. Then set the  Screen jump function to "Screen Jump", set the "Jump to" page number to 2, and define page 2 as parameter setting page. In order to hide the setting page, set the "Encryption" attribute to be valid, and only when the system password is open it is possible to jump to the page 2.



After the function keys are set, place the text "Parameter setting" on the right side of the key graphic to remind the operator, press the "◀" key to directly enter the parameter setting screen. As shown below:

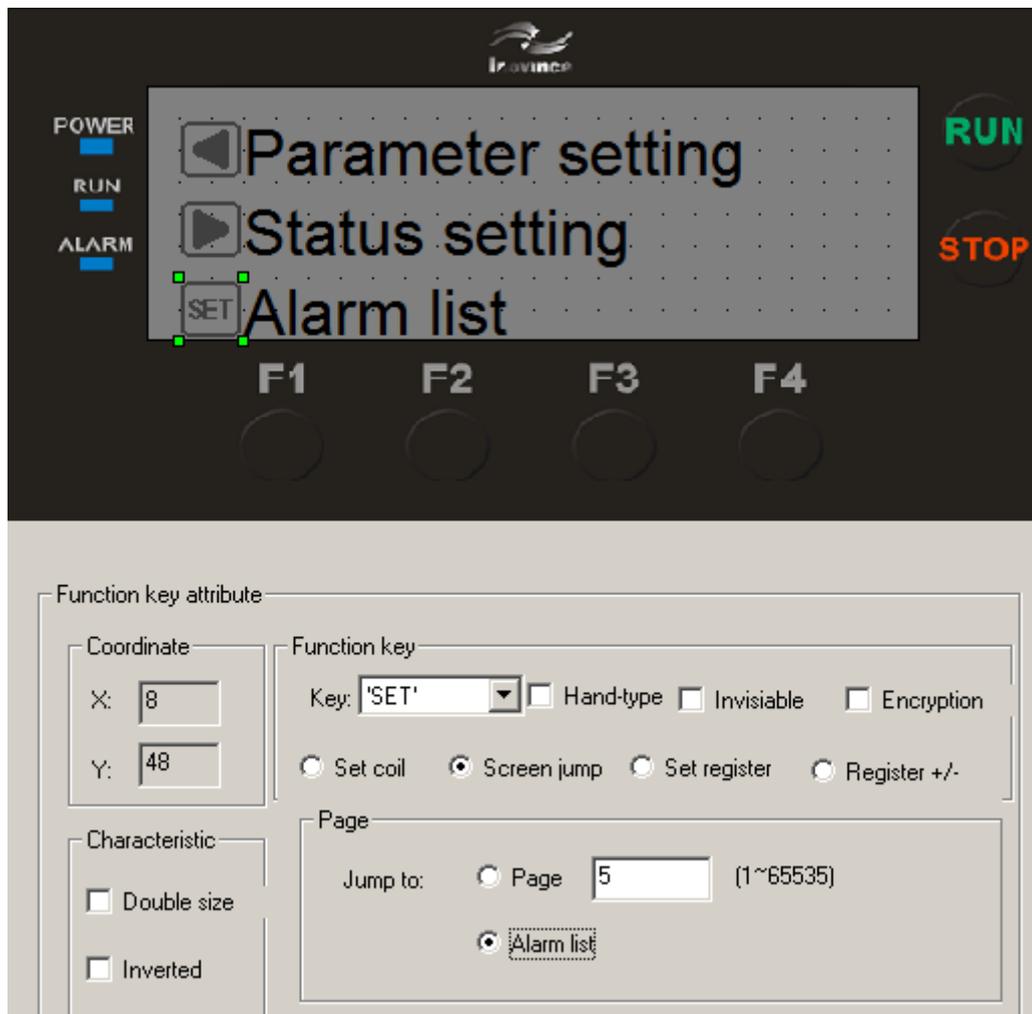


In the same way, place the function key "▶" and the text "Status setting" on the right side of the screen, which means the "▶" key must be pressed to enter the status setting page. The No. 5 page can be set as the status setting page.



Note: In order to insert new pages at any time, it is recommended to separate page numbers of different types of pages. For example: if you want to add a parameter setting page, you can place it in the No. 3 page.

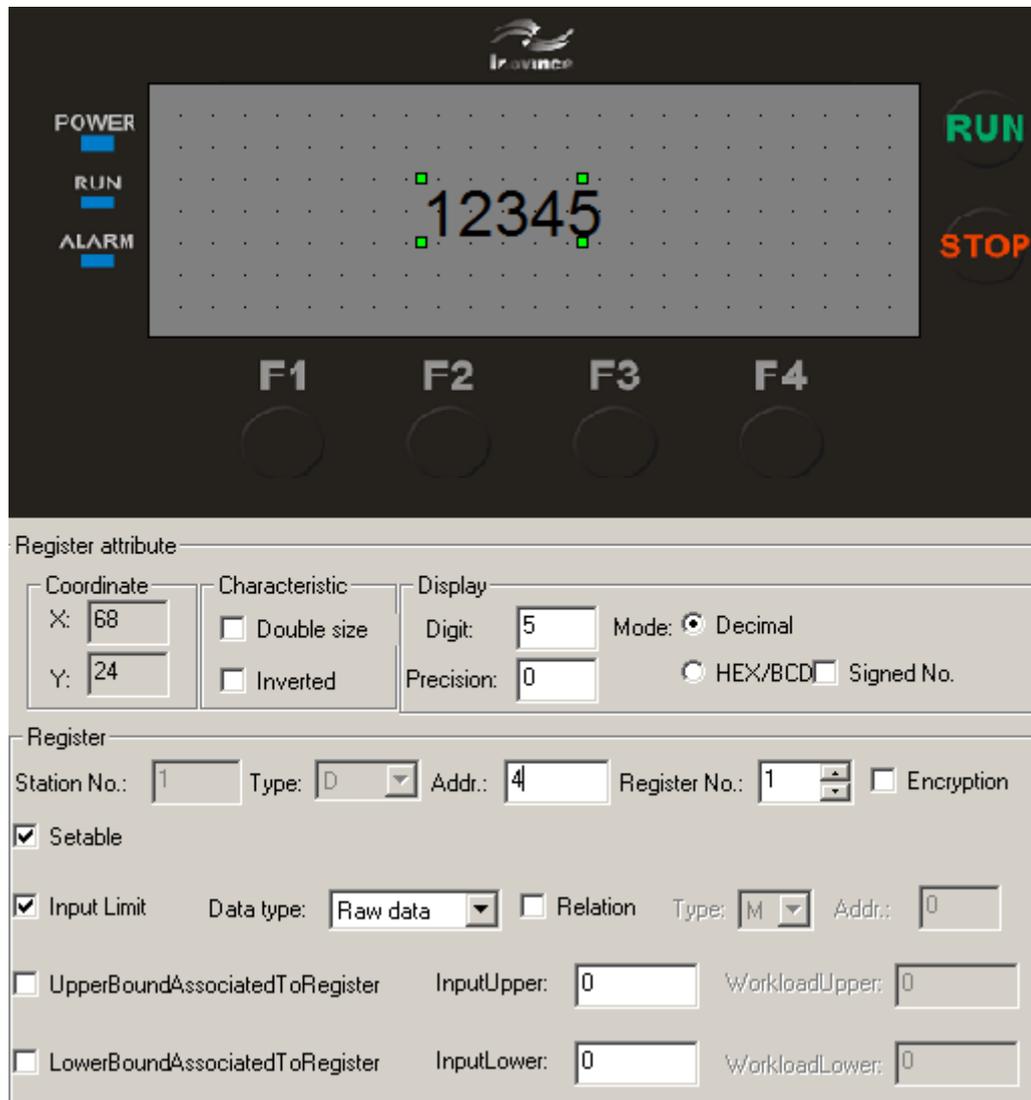
Add another "Alarm list" page jump button. When you press this key, you can jump to the alarm list page to view the corresponding alarm information. As shown below:



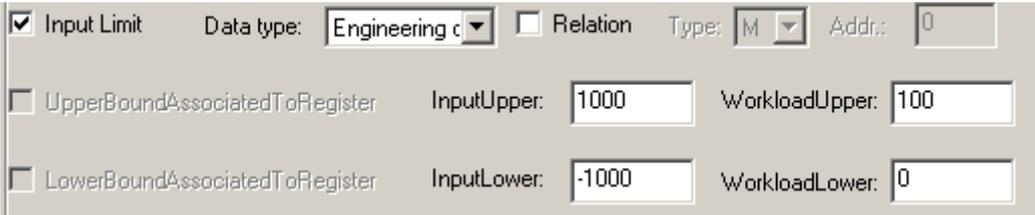
Please refer to "4.11 Alarm List" for the method of logging in to the alarm list.

## 4.4 Register

For data register function and click the  control button. A rectangular dashed frame that moves with the mouse appears on the screen. After moving to the proper position, press the left mouse button to confirm the position. 5 digits such as "12345" are displayed inside the dashed frame, indicating that the control is a register display window or register setting window with a length of 5 digits. The dialog window has the following attributes:

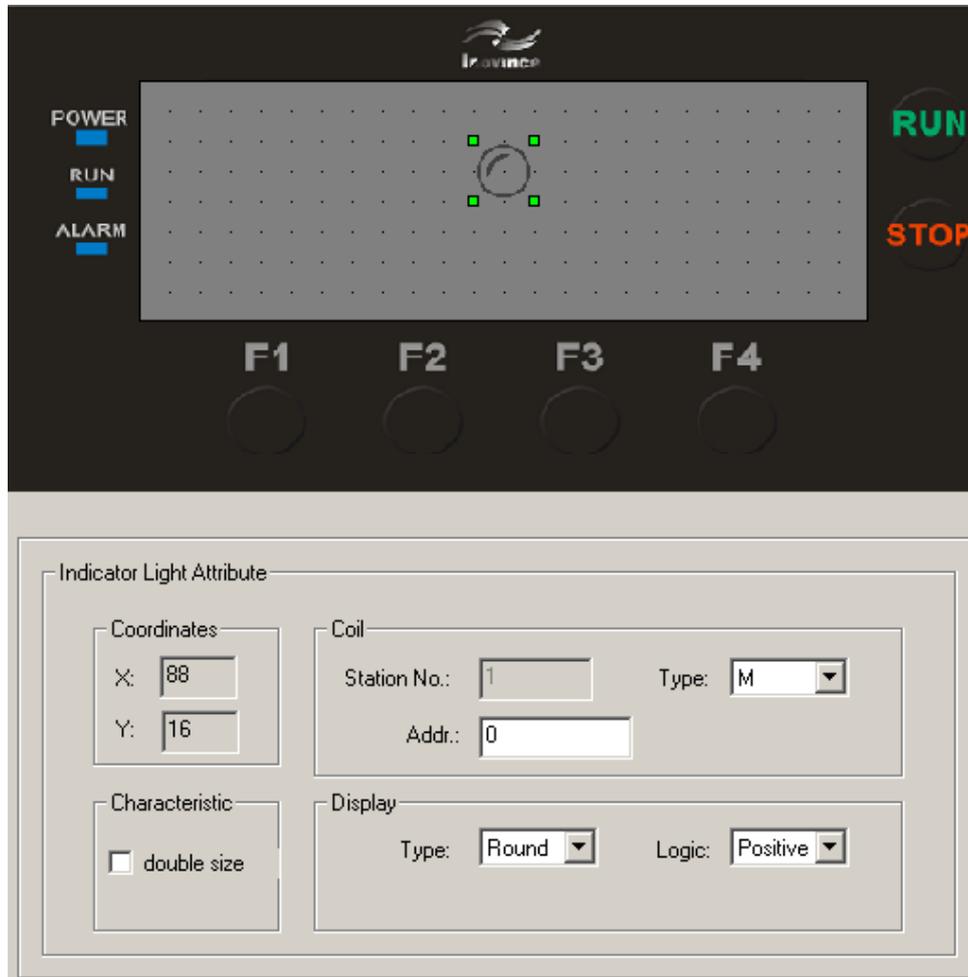


Addr	The PLC register address corresponding to the display control.
Register No.	Continuously display or set the number of registers, the minimum is 1 and the maximum is 2.
Setable	The control has a setting function, which can read data and write data. If the "Setable" option is checked in the parameter setting, it is used to write data.
Encryption	It can be set only when the permission level is higher than 0.
Input upper and lower limits	The input upper and lower limit register setting window has upper and lower limits, allowing to set the maximum and minimum values of data. When selecting engineering data, it is necessary to set the upper and lower limits of input and the upper and lower limits of engineering quantity. The upper and lower limits of the

	<p>engineering quantity refer to the percentage of the setting data in the upper and lower limits of the input. As shown below:</p>  <p>Display value = <math>(\text{input value} - \text{input offline}) / (\text{input upper limit} - \text{input lower limit}) * (\text{engineering upper limit} - \text{engineering offline})</math>. When the data is set to -1000, the offline 0 of the register is displayed. When the setting data is 0, the register data amount is 50. When 1000 is entered, the register data is displayed as 100.</p>
Digits	Display or set the maximum number of digits of data.
Decimal	Reserve the number of significant digits after the decimal point.
Precision	Display the data in the register in decimal form.
Signed number	This attribute can be selected only when the data is displayed in decimal form. If the highest bit of the register is 1, the data is displayed as a negative number. Example: FFFE <sub>H</sub> means -2.
Hexadecimal/BCD	Display the data in hexadecimal form.
Operation method	When the register attribute is settable, the register data can be set. The setting method is that the corresponding register box is selected by pressing the "SET" key. At this time, you can press the number key to enter the number and press the "CLR" key to clear it. If the signed data is selected, press the "+-" key. Change the number sign. You can also use the up, down, left, and right keys to modify the value of each digit. For the modification method, please refer to the previous "Keys". After setting, press the "ENT" key to write, and the next register is set by default. If you press the "ESC" or "SET" key, the data setting will be cancelled.

## 4.5 Indicator light

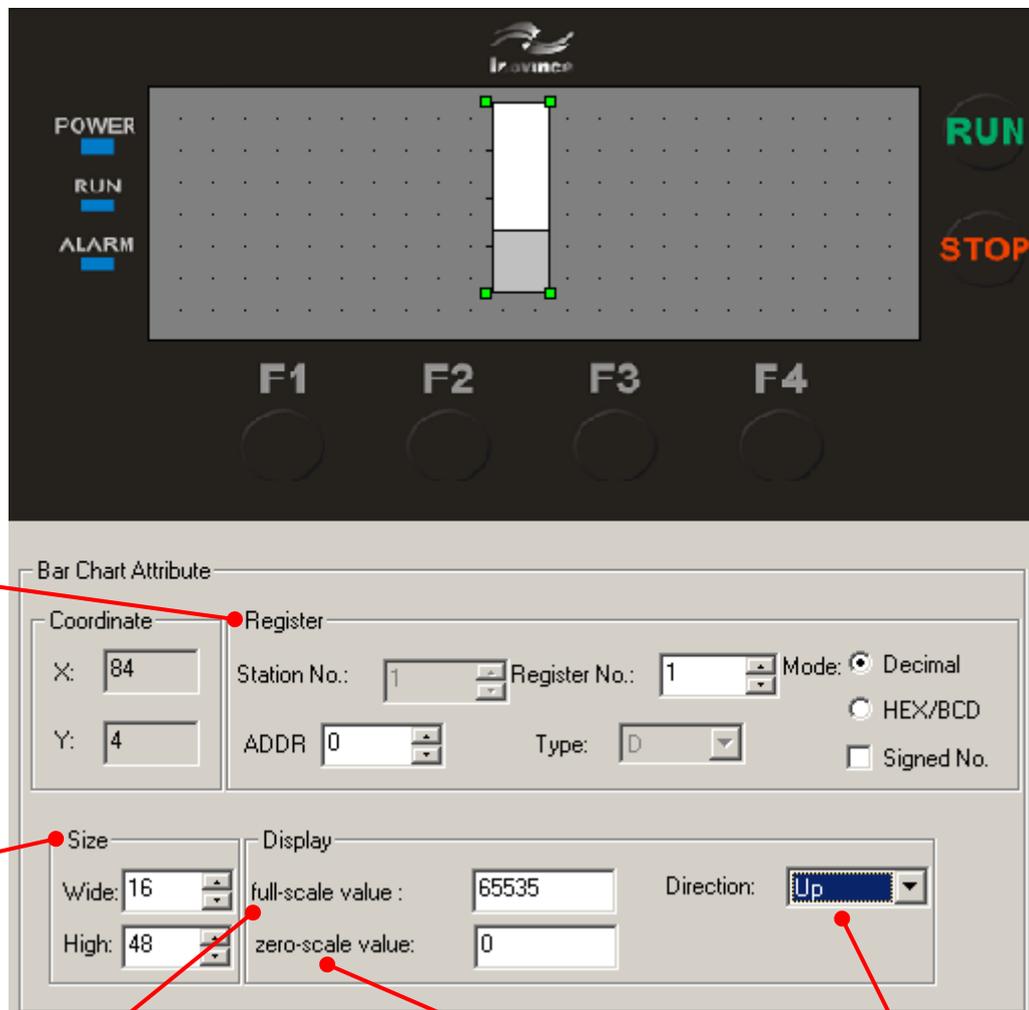
Click the  control button to insert the indicator, a rectangular dashed frame appears on the screen, and follow the mouse to move the moving distance is an integer multiple of 4 pixels, now press the left mouse button to confirm the position. After confirming, the content "Indicator lamp" is displayed in the window, and the attribute of the indicator lamp is displayed at the bottom of the interface:



Coil number	The type can be selected from four types: M, D, X, and Y. The address range is limited to 0~8499. But it should be noted that the range of M components is M0~M3071, M8000~M8499. The address range of X and Y is 0~7, 10~17, if you choose an invalid address within 0~8499, the programming software can set it but it has no specific meaning. Note: If the D element is selected, the indicator light is off when the D element is 0, and the indicator light is on when the D element is not 0.
Display type	The shape of the indicator light includes square and round shapes.
Positive logic	When the corresponding register is ON, the indicator light shows solid; when the corresponding register is OFF, the indicator light shows hollow.
Negative logic	When the corresponding intermediate register is ON, the indicator light shows hollow; when the corresponding intermediate register is OFF, the indicator light shows solid.

## 4.6 Bar graph

The bar graph is used to visually display analog parameters, such as flow, pressure, and liquid level. Height, width and direction can be arbitrarily specified. Click the  control button, a rectangular dashed frame that moves with the mouse appears on the screen, move to the proper position and press the left mouse button to confirm. As shown below:



Register address corresponding to bar graph

This value determines the width and height of the bar graph

When the bar graph is displayed on 100% scale, the corresponding value of the register

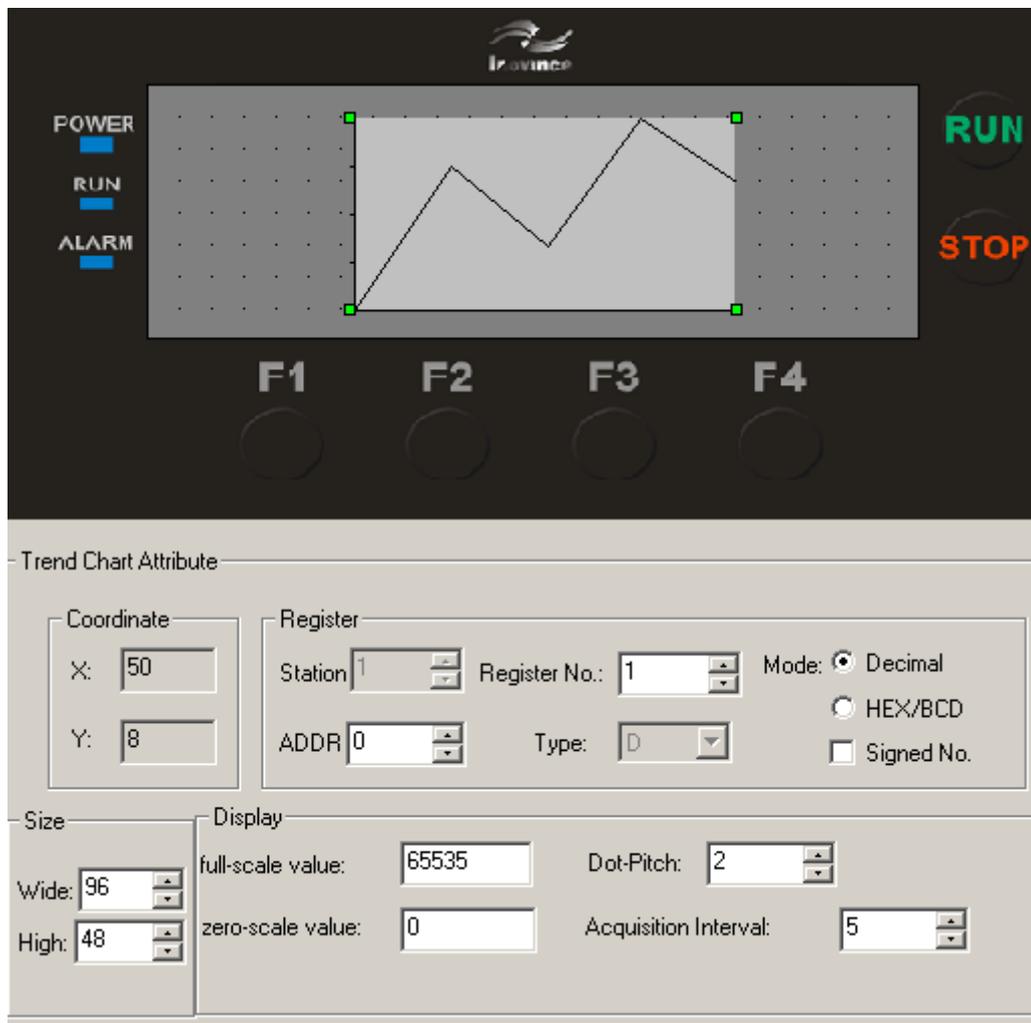
When the bar graph is displayed at 0% scale, the corresponding value of the register

Bar graph display direction, can be up, down or left or right

## 4.7 Trend chart

In the process of industrial control, some parameters change slowly. In order to understand the change process of these parameters in a certain period of time, a trend chart can be established.

Click the  control button, a rectangular dashed frame that moves with the mouse appears on the screen, move to the proper position and press the left mouse button to confirm.



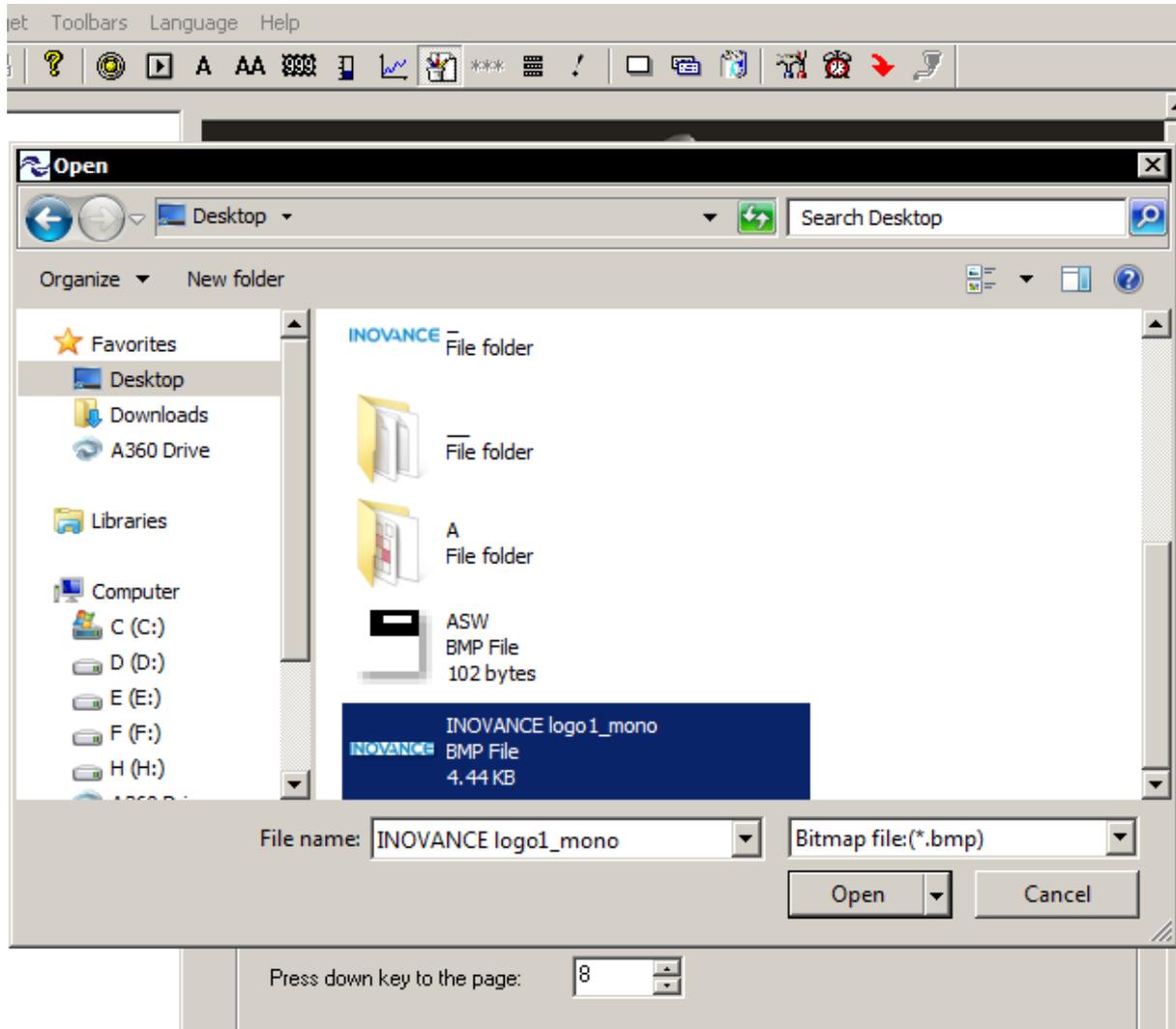
ADDR	The register address corresponding to the trend graph.
Full-scale value	When the trend graph is displayed on 100% scale, the value corresponding to the register.
Zero-scale value	When the trend graph is displayed at 0% scale, the value corresponding to the register.
Dot- pitch	The total number of sampling points from left to right in the entire trend graph. The larger the value, the faster the line chart changes, and of course the time will be longer. Maximum dot pitch = width - 2. If the segment degree is 94, the highlight data range that can be set is 2~92.
Acquisition interval	The interval between every two sampling points.
size	This value determines the length and width of the line chart.

Note: A trend chart control can only display one polyline.

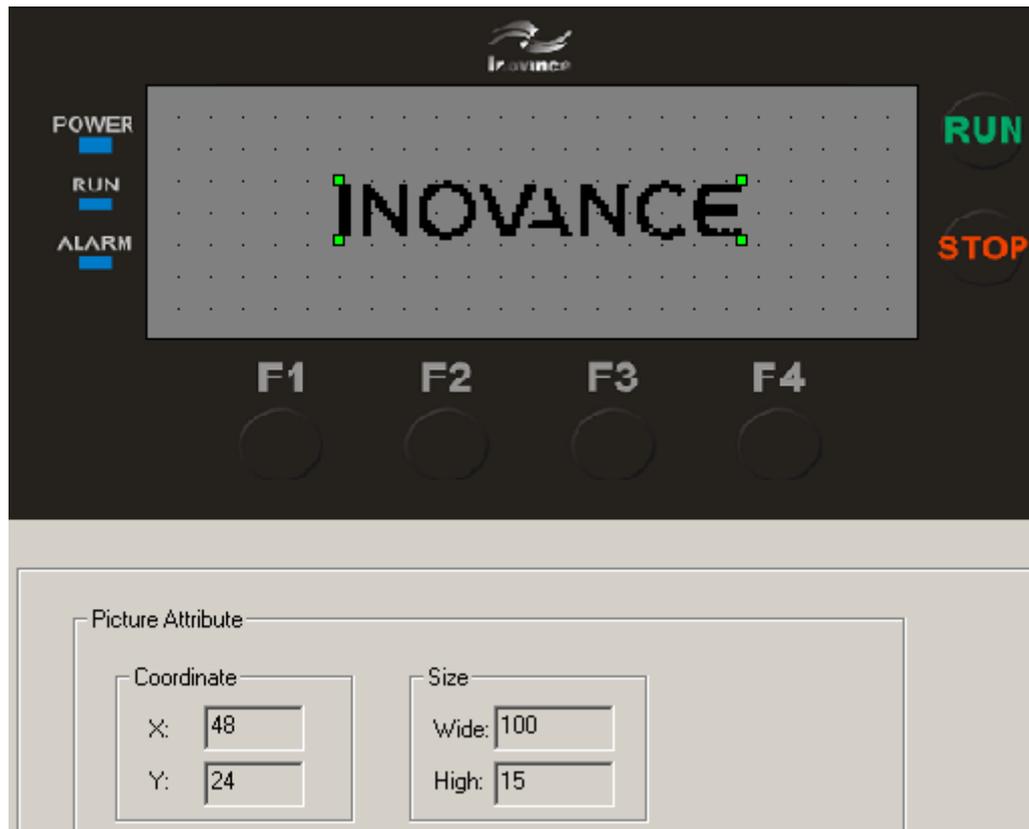
## 4.8 Graphics

Inserting a bitmap file can display the graphics of the machine so that the operator can understand it, and it can also display the company logo and logo to enhance the product image.

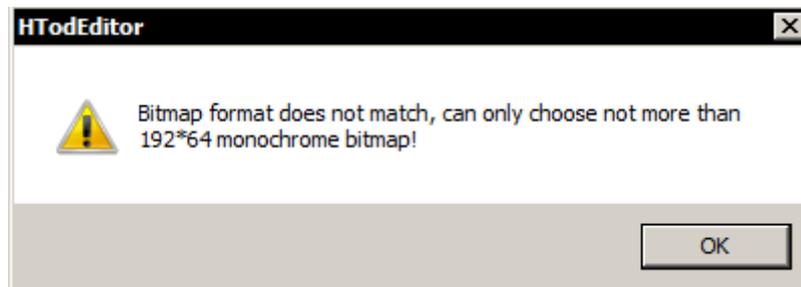
Click the  control button, a search dialog box appears on the screen, as follows:



Select the bitmap file to be displayed, double-click the left mouse button or click "Open", a rectangular dashed frame moving with the mouse appears on the screen, move to the appropriate position and press the left mouse button to confirm. As shown below:

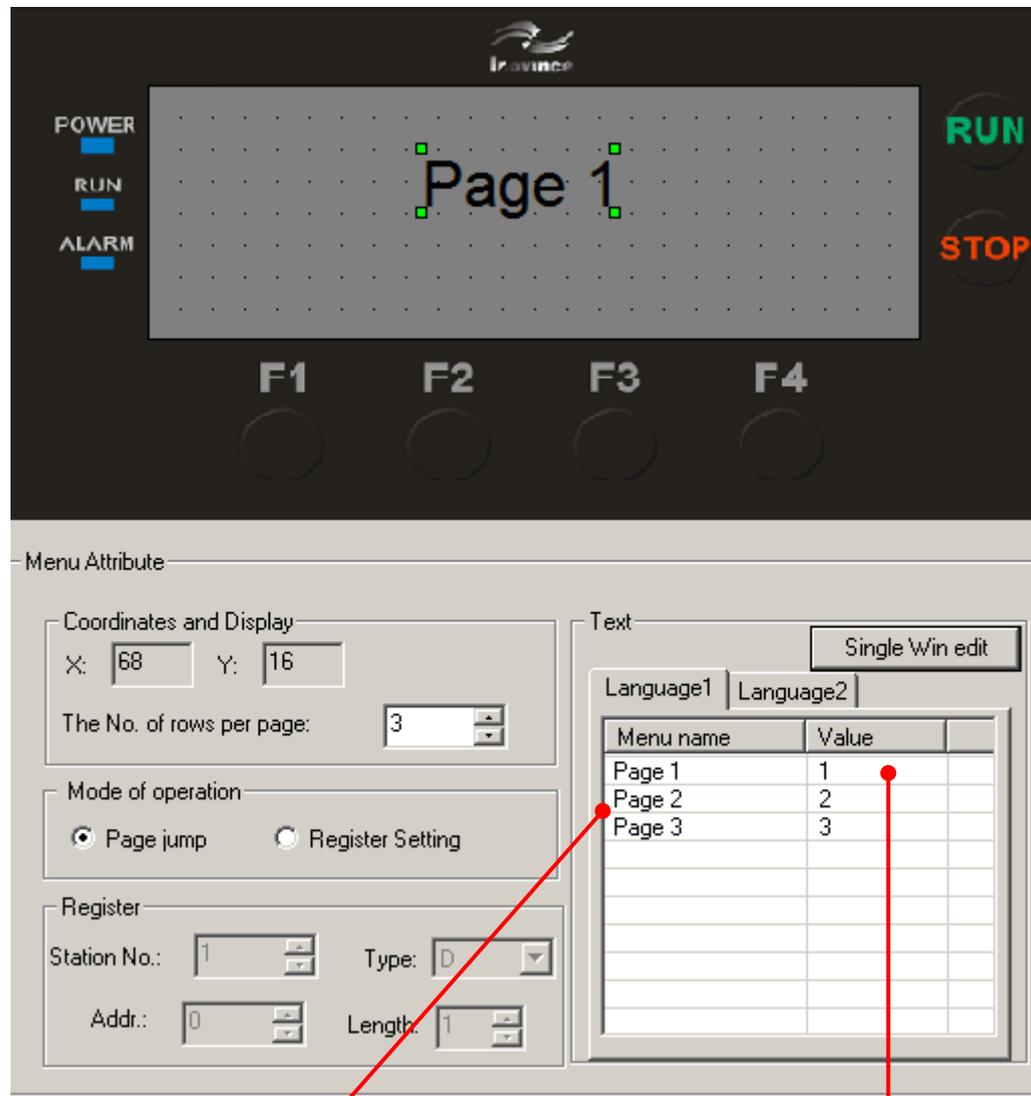


Note: A bitmap file with a maximum of 192x64 pixels can be displayed. If the number of pixels is too large or the file does not have bitmap format, the software will pop up the following dialog box:



## 4.9 Menu

This control can display registers in a menu. The user can select the menu options by pressing the “▲” and “▼” buttons on the display. After selecting the corresponding menu, press the ENT key to set the register, or jump to the corresponding interface.

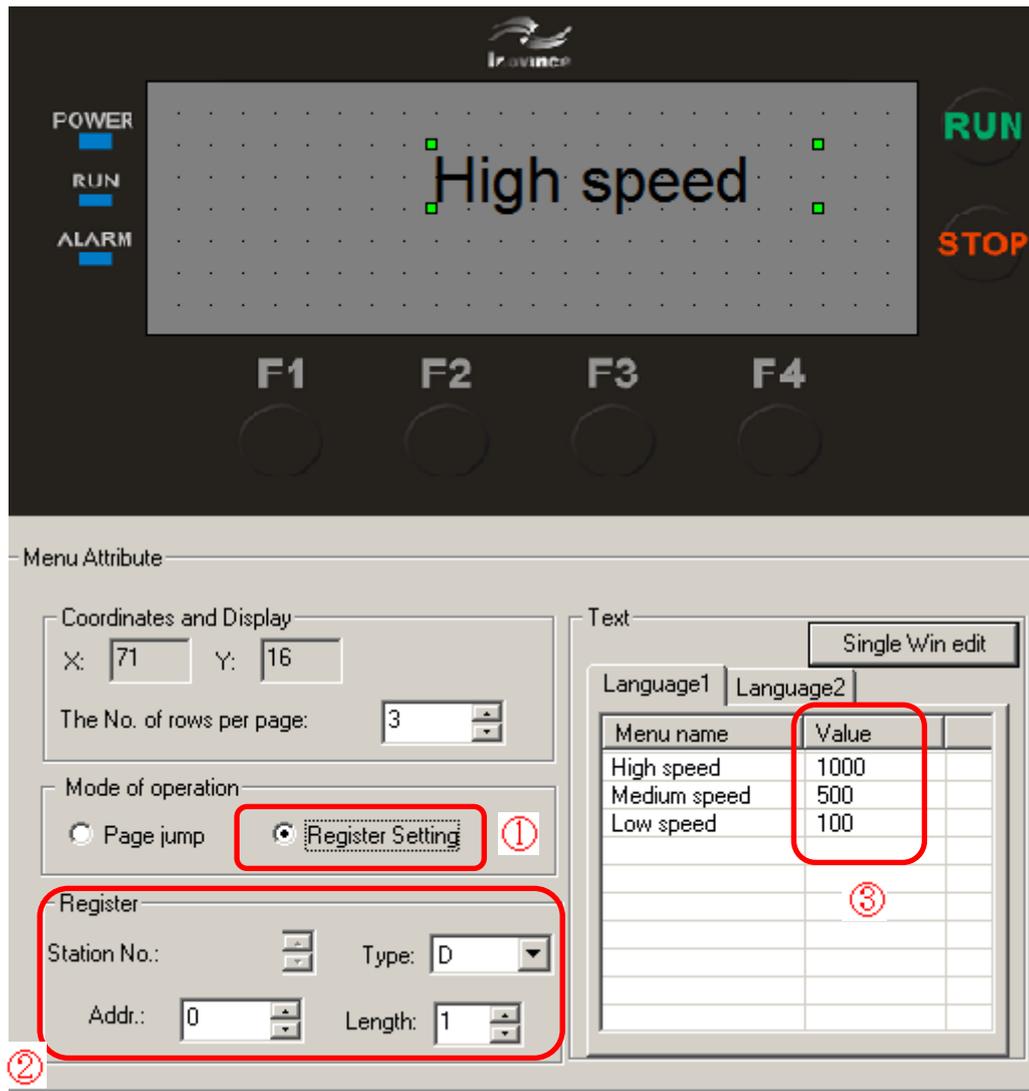


When the user selects the menu name through the "▲" and "▼" buttons, the system will jump to the corresponding operation value page

When "Screen Jump" is selected, the operation value here indicates the corresponding jump page

When the user selects the "screen jump" function, the operation value corresponding to the menu name on the right indicates the corresponding jump page number.

When the user selects the menu name by pressing the "▲" "▼" buttons, the system will jump to the page corresponding to the operating value.

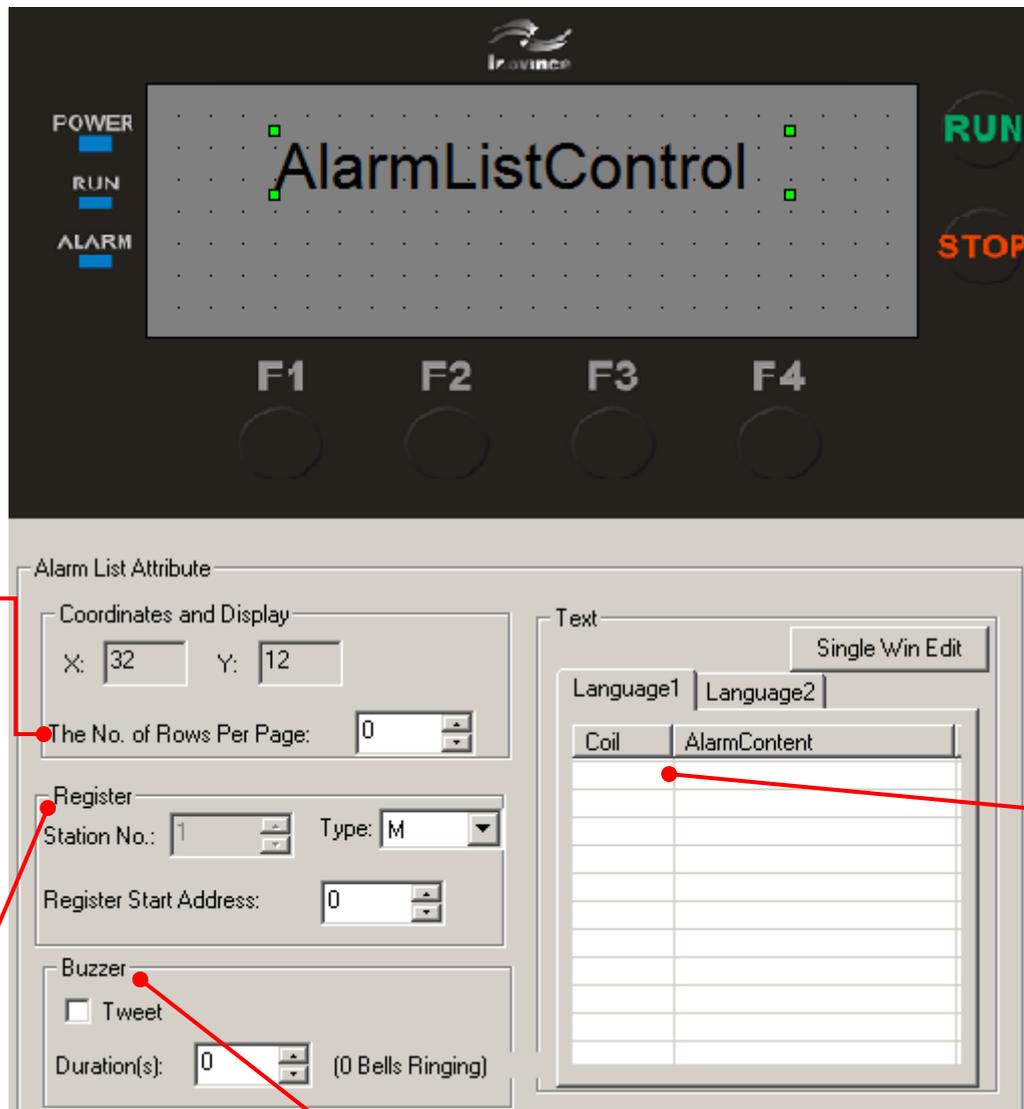


- ① Select "register setting";
- ② "Register" is valid and the register address can be set;
- ③ Operating value here represents the value to be written into the register.  
For example: when the user selects the "High Speed" menu item through the "▲" "▼"

The current menu options support Chinese and English. You can enter the Chinese menu name or English menu name in Language1 and Language2 respectively.

### 4.10 Alarm List Control

Set the "Alarm List Control", when an alarm occurs when the PLC is running, the corresponding register can be set. At this time, the control associated with the "Alarm List Control" will display the alarm information on the screen.



Because of the limited interface width, the number of alarms displayed in each group can be set by the number of lines displayed on each page

For the register associated with the alarm menu, after setting the first address, the number of alarm messages is associated with the corresponding number of registers.

After selecting the buzzer, the buzzer will beep when an alarm occurs, and the duration of the beep can be set.

Set the alarm content on the right, and the coil on the left will automatically assign the alarm coil according to the start address.

When multiple alarm messages appear, the current page can only display the alarm information set in "Display lines per page", and you can observe all the alarm information by pressing the up and down buttons.

#### 4.11 Alarm list

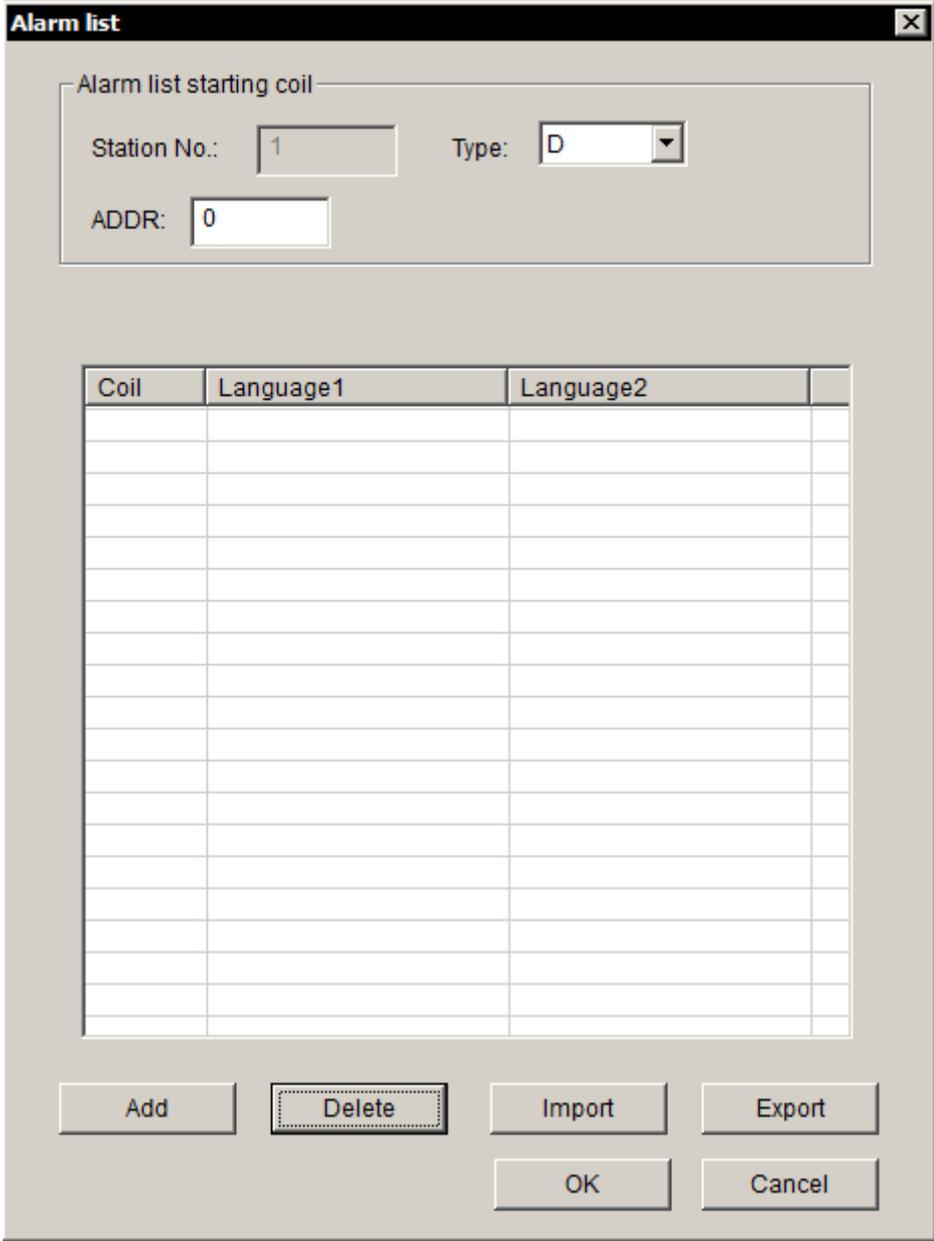
The alarm list is the simplest and most intuitive way of creating alarm events in industrial automation control applications.

Each project of HTodEditor can set a group of alarm list information. One alarm message corresponds to one intermediate relay. The definition number of the intermediate relay is continuous, and the first address of the intermediate relay can be set by the user according to the actual user program.

When any one of the intermediate relays jumps from OFF to ON, it means that when the corresponding alarm occurs, HTodEditor will automatically pop up the alarm display page and display the alarm information on the first line.

When the other intermediate relay is ON, a new alarm message will be displayed from the second line. On the contrary, after a certain alarm relay turns OFF, the corresponding alarm message disappears automatically. The alarm login method is as follows:

Click the  control button, and the alarm list dialog window will pop up:



Alarm list starting coil

Station No.: 1      Type: D

ADDR: 0

Coil	Language1	Language2	

Add      Delete      Import      Export

OK      Cancel

After setting the alarm content and coil, the system will automatically associate the alarm content with the coil. The difference from the "Alarm List Control" is that the "Alarm List Control" is only valid on this page, while the alarm list is valid on all interfaces. "Alarm List Control" only displays alarm information on the current page, while "Alarm List" jumps to the alarm page to display alarm information after an alarm occurs.

The original page is restored after displaying for 5 seconds. The alarm page number is 65535 by default. If users need to view the alarm information, they can also jump to the 65535 interface to view the alarm information.

When the alarm control and the alarm list exist at the same time and the related components are different, the priority of the alarm control is higher than that of the alarm list; if the related components of the alarm control are the same as the related components of the alarm list, the system will only display the alarm information of the alarm control. When the alarm of the alarm control is eliminated then it analyses the alarm information in the alarm list.

#### 4.12 Password function

The password level is divided into 4 levels: level 0 means the lowest level, level 4 is the highest-level password. Users can enter all pages with a lower level than the current system password but cannot enter pages with a higher level than the current system password. There is a password level setting on each page. For example, the current password level is 1, and the password level of this page is 2, then the user cannot enter the page. At the same time, the key operation also has an encryption function. If the control property selects "Encryption", the control can only be operated when the control is above level 0.

The password function uses a special register to operate the password. Divided into 4 functions of "password level display, password lock, unlock and change password".

- 1) Current password level display: it is a read-only register, and the user can obtain the current system password level through this register.
  - 2) Password lock: can be locked from a high-level password to a low-level password. For example, the process personnel need to modify the process parameters and enter the system level 3, after the modification is completed, set M8311 and the current password level becomes level 0 to prevent the operator from arbitrarily modifying the process parameters. Note: Only password locks lower than the current level can be locked. For example, if the current password is level 3, the system level becomes 2 if M8313 is set, the system level becomes 1 if M8312 is set, and it is invalid if M8314 is set.
  - 3) Unlock: D8315 is the current password input register, D8316 is the level to be unlocked, and M8315 is the unlock confirmation function. For example, the current system password level is level 1, and you need to enter the level 3 password system. At this time, enter the level 3 password in D8315, enter 3 in D8316, and then set M8315. If the password is entered correctly, the system level will automatically increase to level 3. If the password is entered incorrectly, you can observe the current system level through D8310 to determine whether the unlocking is successful.
  - 4) Password change: Set the password to be modified at the corresponding D component, and then set the corresponding M component to modify the password. If the modification is unsuccessful, the D component will become 0. Note: The low-level password can only be modified in the high-level state. For example, the current password level is 3. You can modify the level-3, 2 and 1 passwords, but you cannot modify the 4 passwords.
- Example: To modify the level 2 password, enter the new password in the D8318 register, set M8318, and set the new password to take effect.

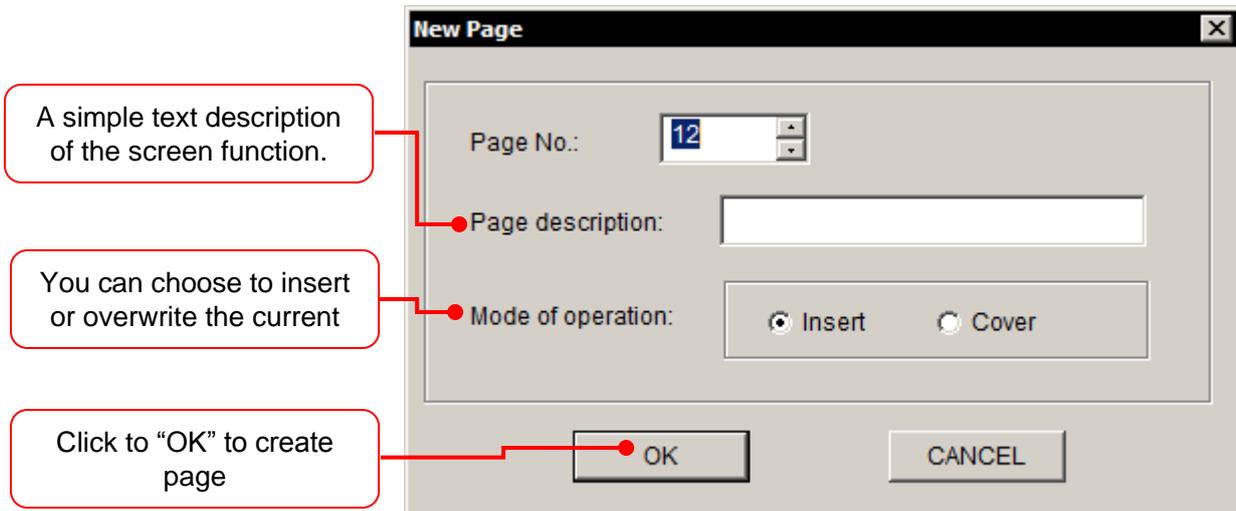
D8310	Current password level (display)	M8310	/
D8311	/	M8311	Level 1 password lock
D8312	/	M8312	Level 2 password lock
D8313	/	M8313	Level 3 password lock
D8314	/	M8314	Level 4 password lock
D8315	Password unlock input	M8315	The current level password is unlocked
D8316	Password level input	M8316	/
D8317	Modify level 1 password	M8317	Level 1 password update
D8318	Modify level 2 password	M8318	Level 2 password update
D8319	Modify level 3 password	M8319	Level 3 password update
D8320	Modify level 4 password	M8320	Level 4 password update

- Note: If the password level of the jump page is higher than the current password level, the jump page is unsuccessful, and the original interface remains as it is. It is recommended that if the page is redirected to a page with level 0 when the password lock function is executed, the page will not jump even if the current page level is higher than the password level after the password is locked.

## 5 Create and download project

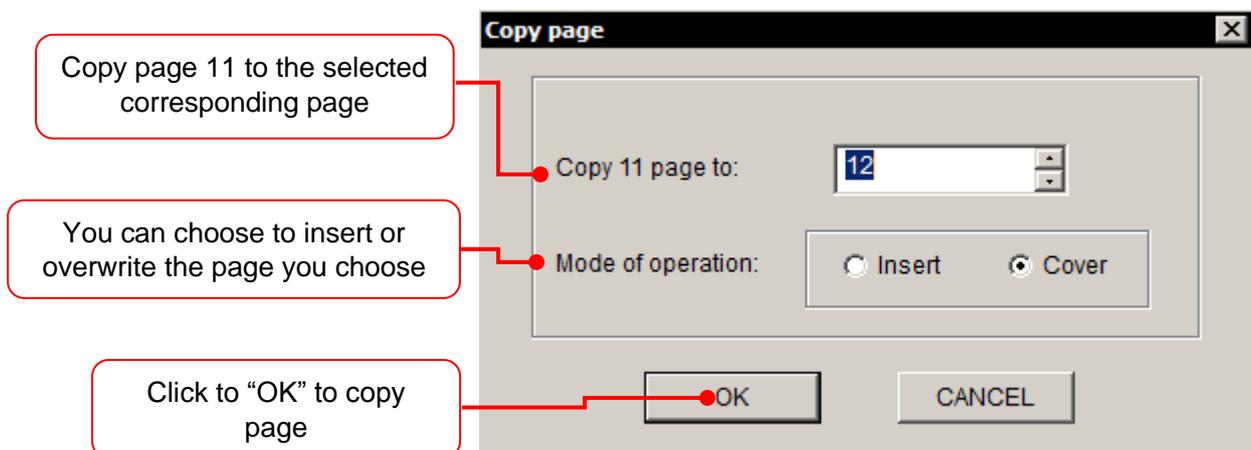
### 5.1 New page

Open "Page/New Page" in the HTodEditor software menu, or click the  icon on the tool button, and the following dialog box will pop up:



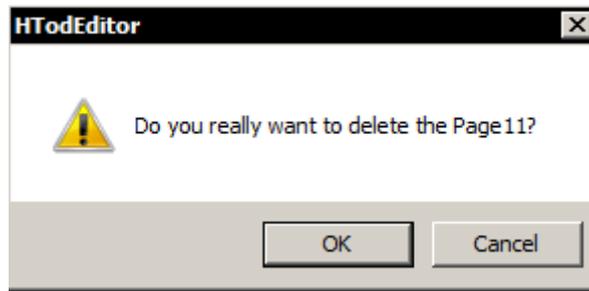
### 5.2 Copy page

Open the "Page /Copy Page" of the HTodEditor software menu, or the icon  on the toolbar, and click to pop up the following dialog box:



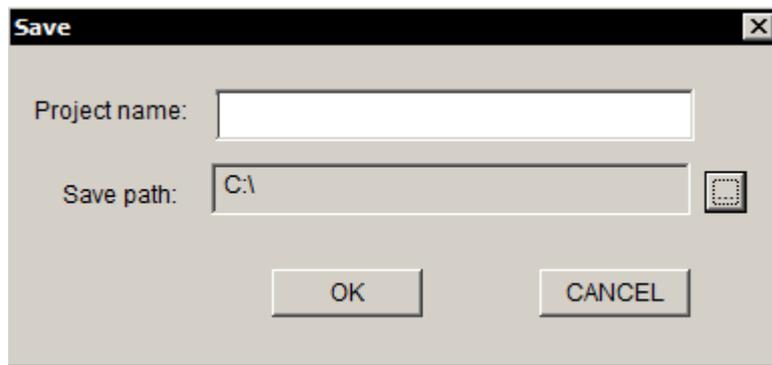
### 5.3 Delete page

Select the page you want to delete, open the "Page /Delete Page" in the HTodEditor software menu, or the  icon on the toolbar, click to pop up a confirmation dialog box, and select "OK" to complete the page deletion.



### 5.4 Save the project

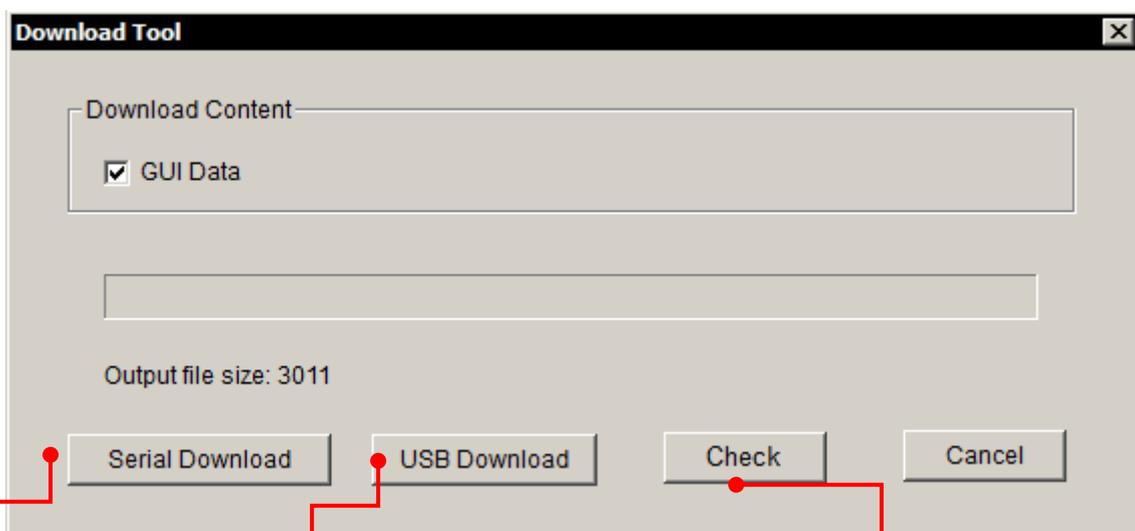
After finishing the page editing, you can save the project file and download the display project to H0U, ready for online debugging. Press the key , and the following dialog box will pop up.



Enter the project name, select the correct path, and press "OK" to save.

### 5.5 Download display project

Use the communication download cable to connect the computer's USB port to HMI's type-B USB port OR via computer serial port and confirm that H0U has been connected to +24V power supply. Press  (File Download) button, the following dialog box will pop up:



Download the page configuration to H0U

Verify that the loaded page configuration is correct

Successful download-"File download complete"  
 Download failed-"Connect to device...failed"

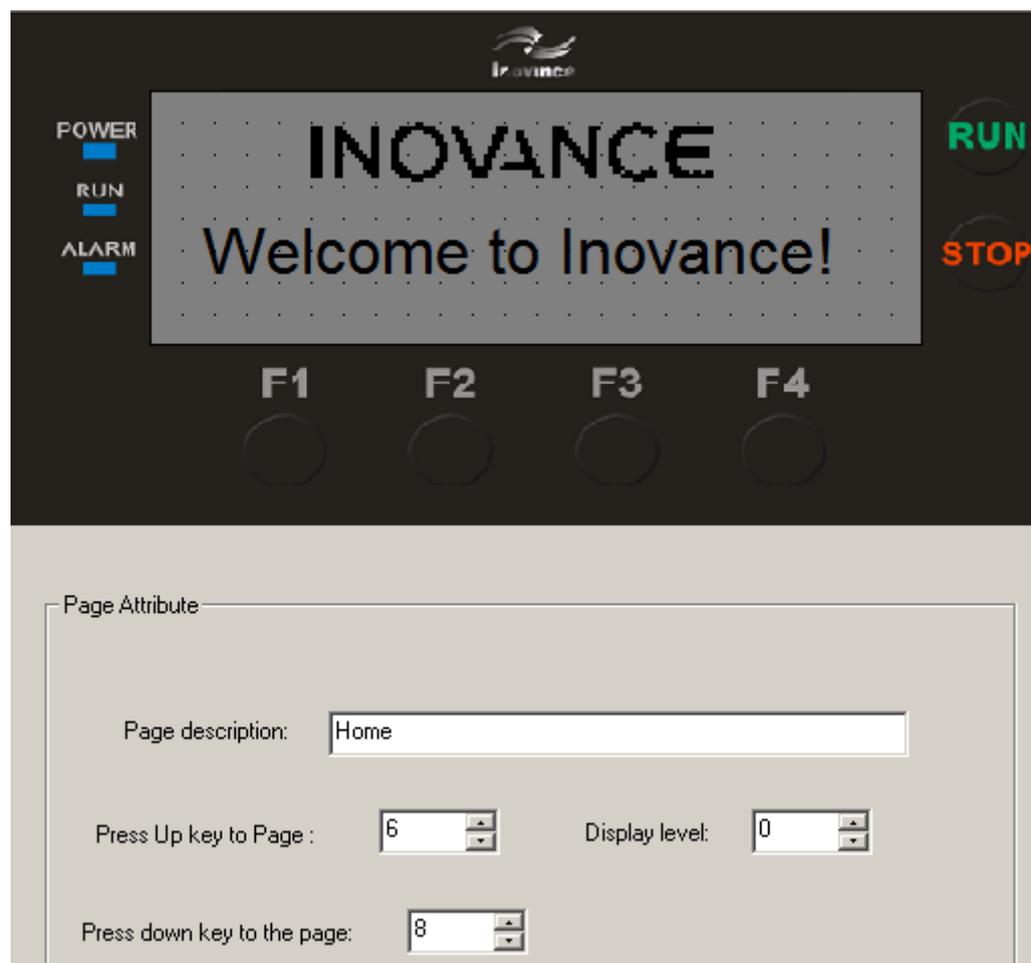
## 6 Examples

### 【Example】

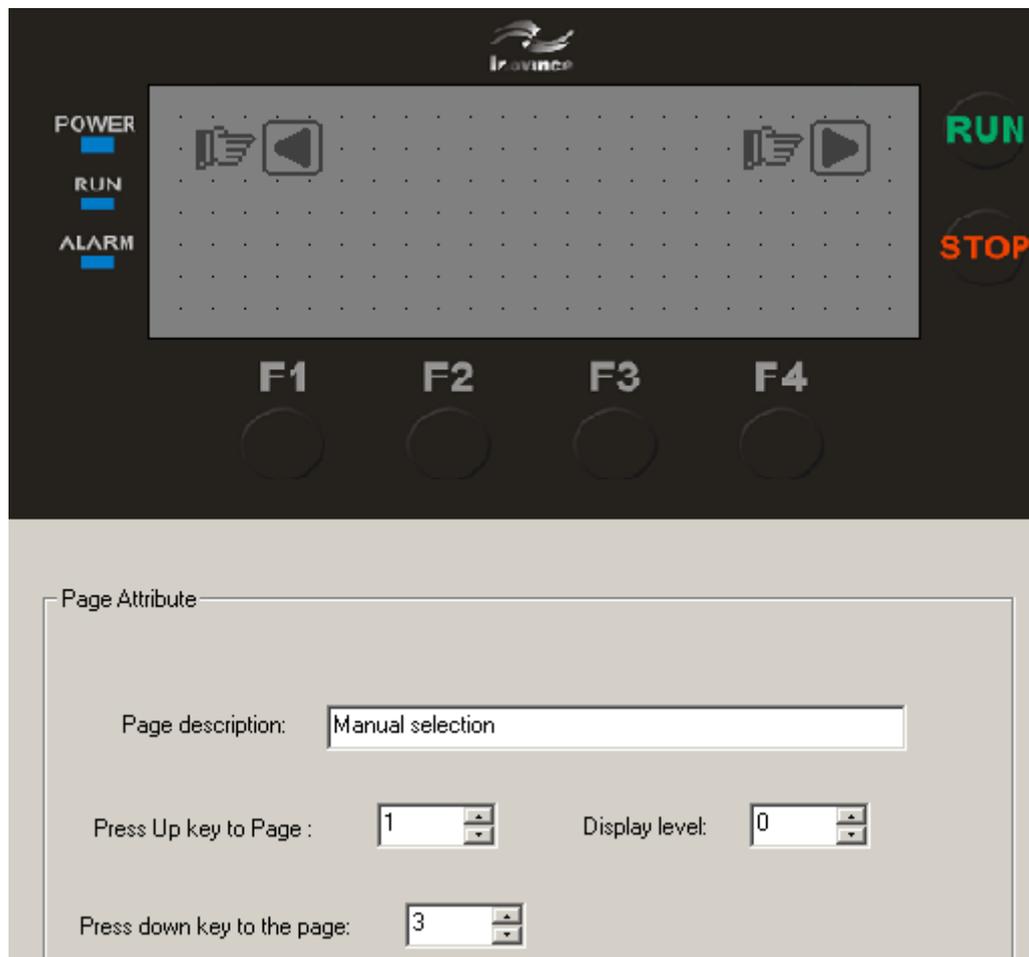
Set 4 indicator lights.

ON and OFF indicators for manual control and automatic control. The steps are as follows.

Step 1: Open the HTodEditor software, set the home page: the page description is "Home"; add the "picture" control as the company icon; add the "static text" control, and edit the content as "Welcome to Inovance". The completed layout is as follows.

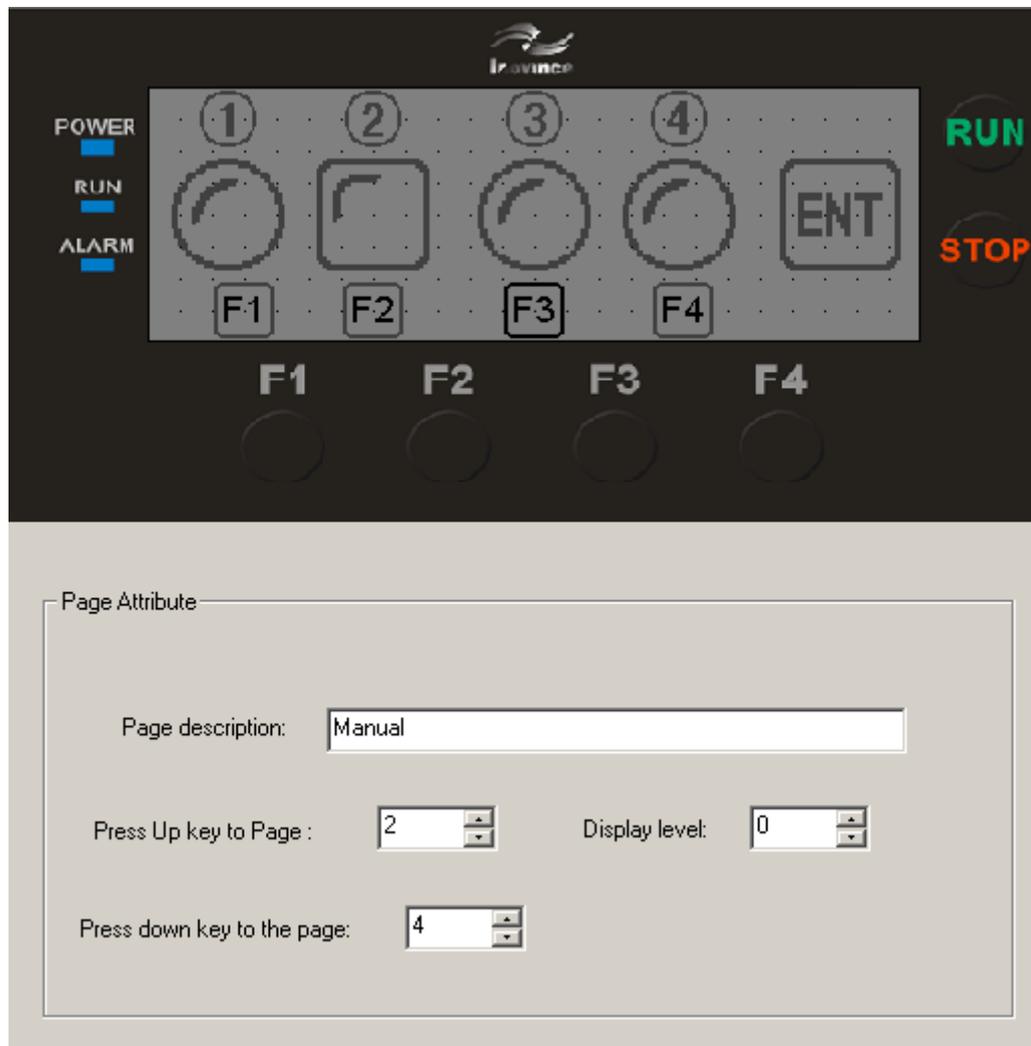


Step 2: Create a new page 2, the page description is "Manual selection", add a "function key" control for "page switching" settings; add a "static text" control to describe the function of the function key. The finished effect is as follows:



Step 3: Create page 3, and the page description is "Manual". Place 4 "indicator" controls and 9 "function key" controls ① ~ ④, F1 ~ F4 and ENT.

As shown in the figure below, "①, ②, ③, ④" is the corresponding light ON indicators, "F1, F2, F3, F4" is the corresponding light OFF indicators: click ①, the following indicator light will be ON, click F1 The indicator will go OFF, and so on. Click "ENT" to return to page 2 "Manual selection".



## Setting of control properties:

The indicator 1, 2, 3, 4 is set to address 10, 11, 12, 13 and the type is set to M; the function key turns ON the light, and the setting is as shown in the figure below.

The address and type should correspond to the indicator, set to ON; Turn OFF the light only need to be set to OFF, the others are the same. As shown below:

Indicator Light Attribute

Coordinates X: 4 Y: 16	Coil Station No.: 1 Addr.: 10 Type: M
Characteristic <input checked="" type="checkbox"/> double size	Display Type: Round Logic: Positive

Function key attribute

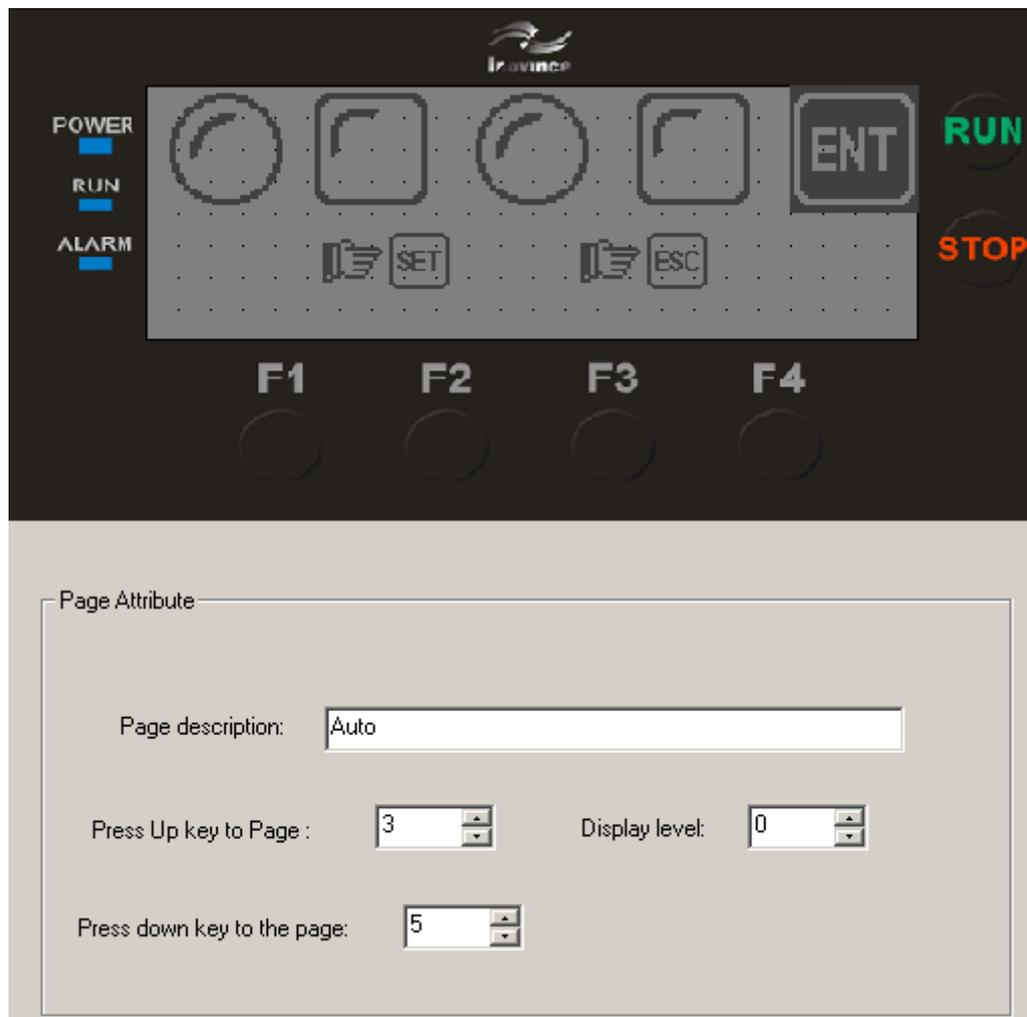
Coordinate X: 12 Y: 0	Function key Key: '1' <input type="checkbox"/> Hand-type <input type="checkbox"/> Invisible <input type="checkbox"/> Encryption <input checked="" type="radio"/> Set coil <input type="radio"/> Screen jump <input type="radio"/> Set register <input type="radio"/> Register +/-
Characteristic <input type="checkbox"/> Double size <input type="checkbox"/> Inverted	Coil Station 1 Type: M Addr.: 10 <input checked="" type="radio"/> Set to ON <input type="radio"/> Set to OFF <input type="radio"/> Reverse <input type="radio"/> Instantaneous ON

"ENT" key is set as shown below:

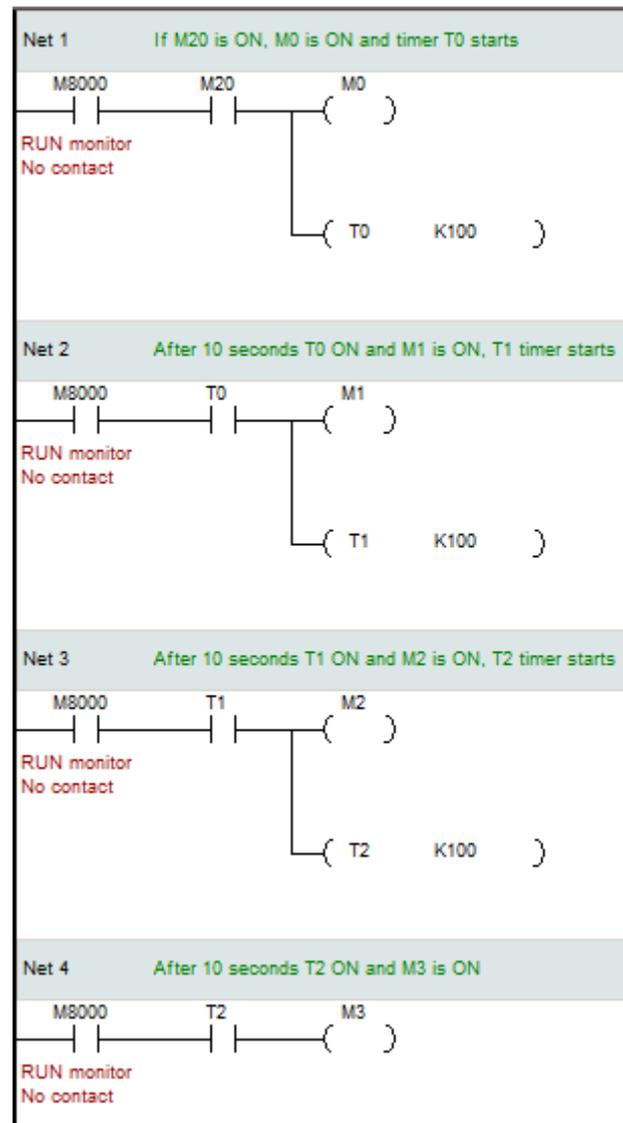
Function key attribute

Coordinate X: 156 Y: 16	Function key Key: 'ENT' <input type="checkbox"/> Hand-type <input type="checkbox"/> Invisible <input type="checkbox"/> Encryption <input type="radio"/> Set coil <input checked="" type="radio"/> Screen jump <input type="radio"/> Set register <input type="radio"/> Register +/-
Characteristic <input checked="" type="checkbox"/> Double size <input checked="" type="checkbox"/> Inverted	Page Jump to: <input checked="" type="radio"/> Page 2 (1~65535) <input type="radio"/> Alarm list

Step 4: New page 4 is "Auto", place 4 "indicators" (F1 ~ F4), and place 3 "function keys": one is to turn ON the indicator, the other is to turn OFF the indicator, and "ENT" is Return to page 2 "Manual selection".



To create an automatic page, you need to write a simple PLC program, as shown in the figure below, when you press the "SET" key to turn ON the indicator, the first indicator will be ON initially, and the next indicator will be ON after 10s. Press "ESC" to turn OFF all the indicators.



Control property setting: indicator 1, 2, 3, 4 set address 0, 1, 2, 3, type set to M; function key “SET” to turn on the indicators, set as shown in the figure below (type is M, address is 20, set to ON)

Indicator Light Attribute

<p>Coordinates</p> <p>X: <input type="text" value="4"/></p> <p>Y: <input type="text" value="0"/></p>	<p>Coil</p> <p>Station No.: <input type="text" value="1"/> Type: <input type="text" value="M"/></p> <p>Addr.: <input type="text" value="0"/></p>
<p>Characteristic</p> <p><input checked="" type="checkbox"/> double size</p>	<p>Display</p> <p>Type: <input type="text" value="Round"/> Logic: <input type="text" value="Positive"/></p>

Function key attribute

<p>Coordinate</p> <p>X: <input type="text" value="44"/></p> <p>Y: <input type="text" value="36"/></p>	<p>Function key</p> <p>Key: <input type="text" value="'SET'"/> <input checked="" type="checkbox"/> Hand-type <input type="checkbox"/> Invisiable <input type="checkbox"/> Encryption</p> <p><input checked="" type="radio"/> Set coil <input type="radio"/> Screen jump <input type="radio"/> Set register <input type="radio"/> Register +/-</p>
<p>Characteristic</p> <p><input type="checkbox"/> Double size</p> <p><input type="checkbox"/> Inverted</p>	<p>Coil</p> <p>Station: <input type="text" value="1"/> Type: <input type="text" value="M"/> Addr.: <input type="text" value="20"/></p> <p><input checked="" type="radio"/> Set to ON <input type="radio"/> Set to OFF <input type="radio"/> Reverse <input type="radio"/> Instantaneous ON</p>

To turn off the indicator, you only need to select the "ESC" and "Set to OFF" to turn off the indicator, and other attributes are consistent with the function key to turn on the indicator "SET"; the "ENT" key setting is the same as the previous "ENT" key setting.

### 【Complete】

At this point, the project creation is completed, the download is executed, and it can be downloaded to the H0U integrated programmable controller for screen demonstration.

## 7 PLC programming

### 7.1 PLC function

The H0U series PLC functions are basically the same as the H1U series PLC functions, and the instructions are fully compatible with the H1U/H2U series PLC instructions. The difference is:

- 1) The COM0 port of H0U series PLC is a RS485 connection port instead of a RS422 port. The program is downloaded and monitored through the USB to RS232/RS485 converter.
- 2) The function of the COM2 port of H0U is the same as that of the COM1 port. Please refer to the COM2 port configuration of H2U series PLC for the specific usage method.
- 3) H0U has no DIP switch, it runs automatically after power on. Run and stop control can be performed through AutoShop and run and stop operations can be performed through M8035, M8036, and M8037.

### 7.2 Device

The H0U soft element is basically the same as that of the H1U/H2U series PLC, and the D element save function is same as the H1U series PLC.

Application area of D component of H0U series PLC:

For general use	For retentive use	For special use	For variable address use
D0~D127 128 points *1	D128~D7999 7872 points *3	D8000~D8511 512 points	V0~V7 Z0~Z7

Please refer to "Inovance Small PLC Instruction and Programming Manual" V2.1 for the meaning of specific soft elements and special soft element functions. The differences of H0U soft components are:

- 1) The maximum size of M and D of H0U is 8399. There are restrictions in the H0U part of AutoShop, and there are also restrictions in HTodEditor software.
- 2) The password operation of TOD text adopts the mode of special register. For the definition of password special register, refer to the section on password function.
- 3) The 6AT H0U expansion cards use special registers to set and display the analog value and temperature value.

Refer to "Extended Function Part" for the specific meaning of expansion card registers.

### 7.3 Extended functions

H0U has built-in analog expansion cards 6AT, which can be set and displayed through special registers. Users only need to set and read the corresponding special registers, no instructions are required.

D8400~D8409 are display areas, D8410~D8419 are basic parameter setting areas, D8420~D8429 are AD special parameter setting areas, and D8430~D8439 are DA special parameter setting areas.

See the table below for the meaning of specific parameters.

Category	Register	Description
Display Data	D8400	Display 0x6A1x means 6AT station card. Displaying 0x6A2x means 6ATC expansion card. (x represents the expansion version number) Displaying other information means there is no analog expansion card or communication error.
	D8401	AD1 sampled data
	D8402	AD2 sampled data
	D8403	AD function error message
	D8404	DA1 conversion data (display)
	D8405	DA2 conversion data (display)
	D8406	DA function error message
	D8407	Temperature channel 1 temperature value (unit: 0.1°C)
	D8408	Temperature channel 2 temperature value (unit: 0.1°C)
	D8409	Temperature function error message
Basic parameter setting	D8410	0x6A1 means 6AT station card. Displaying 0x6A2 means 6ATC expansion card.
	D8411	AD function mode setting. Each HEX represents 1 input channel. 0: 0V ~ 10V; corresponding digital output 0 ~ 2000 1: 4mA ~ 20mA; corresponding digital output 0 ~ 2000 2: 0mA ~ 20mA; corresponding digital output 0 ~ 2000 Other: invalid
	D8412	AD1 filter constant, the default value is 8.
	D8413	AD2 filter constant, the default value is 8.
	D8414	DA function mode setting. Each HEX represents 1 input channel. 0: 0V ~ 10V; corresponding digital output 0 ~ 2000 1: 4mA ~ 20mA; corresponding digital output 0 ~ 1000 2: 0mA ~ 20mA; corresponding digital output 0 ~ 1000 Other: invalid
	D8415	DA1 output value. The default is 0.
	D8416	DA2 output value. The default is 0.
	D8417	Temperature function mode setting. Every 2 HEX represents 1 input channel. 0x00: Detect PT100 thermal resistance. 0x05: Detect Cu50 thermal resistance. 0x10: Detect K-type thermocouple 0x20: Detect J-type thermocouple
	D8418	Temperature detection 1 channel average filter constant. The default value is 8.

	D8419	Temperature detection 2 channel average filter constant. The default value is 8.
AD offset gain setting	M8420	Setting 1 writes the AD offset gain value. It will automatically return to 0 after writing.
	D8420	0x6A1 means 6AT station card. Displaying 0x6A2 means 6ATC expansion card.
	D8421	AD1 offset
	D8422	AD1 gain
	D8423	AD offset
	D8424	AD2 gain
DA offset gain setting	M8430	Set 1 to write the DA offset gain value. It will automatically return to 0 after writing.
	D8430	0x6A1 means 6AT station card. Display 0x6A2 means 6ATC expansion card
	D8431	DA1 offset
	D8432	DA 1 gain
	D8433	DA 2 offset
	D8434	DA 2 gain
	M8440	Clear the temperature detection disconnection mark.

AD error status is shown in the table below

D8403 (AD sampling error)	ON state	OFF state
Bit 0	There is an error, and any non-zero A/D conversion of Bit 0~Bit 3 will stop	No error
Bit 1	Wrong offset/gain setting	Offset/gain correct
Bit 3	Hardware malfunction	Hardware is normal
Bit 4	Number is outside the range of -2048 to 2047	Digital output is normal
Bit 5	Sampling filter constant exceeds the range of 1 to 4096	Sampling filter constant is normal
Bit 15	AD parameter initialization is unsuccessful, need to set M8420 to reinitialize	AD parameter initialization is normal

DA error status is shown in the table below

D8406 (DA sampling error)	ON state	OFF state
Bit 0	If there is an error, any non-zero D/A conversion of Bit 0~Bit 3 will stop	No error
Bit 1	Wrong offset/gain setting	Offset/gain correct
Bit 3	hardware malfunction	The hardware is normal
Bit 4	The number exceeds the range of -2350 ~ 2350	Digital output is normal
Bit 15	DA parameter initialization is unsuccessful, need to set M8420 to reinitialize	DA parameter initialization is normal

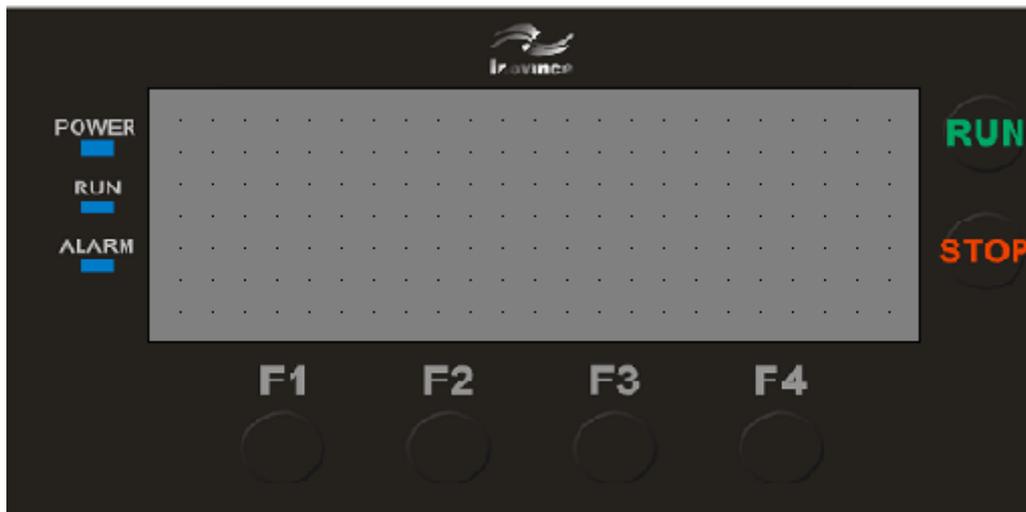
The temperature detection error status is shown in the table below

D8409 (temperature detection error)	ON state	OFF state
Bit0	There is an error, and any non-zero A/D conversion of Bit0~Bit3 will stop	No error
Bit3	Hardware malfunction	The hardware is normal
Bit4	Digital output out of range	Digital output is normal
Bit5	The sampling filter constant exceeds the range of 1 to 256	Sampling filter constant is normal
Bit8	The temperature of the first channel is lower than the measurable temperature	Normal temperature
Bit9	The temperature of the first channel is too high or disconnected	Normal temperature
Bit10	The second channel temperature is lower than the measurable temperature	Normal temperature
Bit11	The second channel temperature is too high, or disconnected	Normal temperature

## 7.4 Indicator light

The general-purpose H0U series PLC has three indicators (as shown in the figure below), namely "POWER", "RUN" and "ALARM".

- POWER: indicates the power status;
- RUN: Indicate the PLC running status, the green indicator light is ON to indicate the execution of the PLC user program, and OFF indicates that the PLC user program is not executed;
- ALARM: indicates an alarm, the red indicator light is on to indicate an alarm has occurred, and off to indicate normal. The specific alarm status and alarm code are consistent with H1U series PLC.



Indicator light	Status	Description
POWER	ON	No power to the system
	OFF	System power up
RUN	ON	H0U series PLC stop
	OFF	H0U series PLC run
ALARM	ON	The system is normal and there is no fault, or the fault has been cleared
	OFF	System failure, alarming

### 1) Communication function

H0U general purpose PLC has 2 RS485 communication interfaces, 1 RS485 download interface (optional), Type-B USB download interface, 1 CAN communication interface (optional).

### 2) Download function

H0U universal type-B supports USB download function. Users can use AutoShop and HTodEditor software to download PLC program and text program respectively to H0U PLC via standard USB cable. The USB driver of Inovance PLC needs to be installed when the new computer uses USB to download for the first time. The driver can be downloaded on the official website of Inovance.

USB download operation is simple, no need to set any settings to download directly after connecting the USB cable. In addition to USB download function, H0U also supports RS485 download function. The user can use the RS232-RS485 converter to connect the two RS485 port to the COM0 port of H0U. But this function is an alternate port for firmware update, which is not available for regular products. If the customer needs to this function, they can contact the relevant personnel of Inovance.

### 3) RS485 communication function

H0U has 2 RS485 functions, supports 1:1, N:N, computer link protocol and Modbus RTU protocol. Modbus RTU protocol supports both master and slave. The communication method and the definition of related special software are consistent with the RS485 function of H2U series PLC.

## Appendix A: H0U-XP series PLC instruction

### A.1 Introduction to H0U-XP series PLC

Inovance H0U-XP series PLC (H0U integrated programmable controller, hereinafter referred to as H0U) is a controller that integrates PLC and TOD text. The control logic and display interface can be user-programmed.

The PLC program storage space is up to 8K steps; it supports all instructions of H1U, and supports CAN communication instructions; supports 6 high-speed inputs and 2 high-speed pulse outputs (transistor output model only); the difference from H1U is that there is no indicator light in the input and output parts and there is no RUN-STOP DIP switch, the program runs automatically after power on; the two communication ports, COM1 and COM2 can be used as master station and slave station; RS485 (COM0) communication port is currently used to download the program. For specific PLC functions, please refer to the "H1U\H2U Series Programmable Logic Controller User Manual" and "Inovance Small PLC Instructions and Programming Manual" separately issued by our company.

The maximum capacity of TOD program is 56kB; TOD is the same as other general human-machine interface products. The interface programming environment of H0U is HTodEditor software, which can place various "controls" on the page and assign required attribute settings to each control, thus complete functions such as status information display, parameter display, parameter setting, etc. The main components of the TOD interface are dot-matrix liquid crystal display (LCD), 3 LEDs, and up to 25 function keys, all of which can be easily defined; the resolution of the LCD is 192×64, which can display 18 English characters×4 lines; TOD supports simplified Chinese and English language display, and can be switched online; the page number is 1 to 65535, and random numbering is allowed.

Use AutoShop and HTodEditor to download programs for PLC and TOD respectively.

#### A.1.1 Naming rules

H 0U – 08 08 M R T    – XP – 6AT  
 ①    ②            ③    ④    ⑤    ⑥    ⑦    ⑧            ⑨            ⑩

- ① Company product information H: Inovance Controller
- ② Serial number 0U: text + PLC integrated controller
- ③ Number of input points 08: 8 points inputs
- ④ Number of output points 08: 8 points outputs
- ⑤ Module classification M: general controller main module
- ⑥ Output type R: Relay output type; T: Transistor output type
- ⑦ Output type T: Transistor output type
- (if item ⑥ and ⑦ both appears, it means mixed output)
- ⑧ Reserved for future expansion
- ⑨ CPU type identification XP: NXP type CPU
- ⑩ Special function identification 6AT: built-in analog expansion card

## A.1.2 Basic parameters

Model Number	Configuration						
	Total Inputs	High-Speed Inputs	Total Outputs	High-Speed Outputs	Output Type	Communication Interface	Built-in Analog Card
H0U-0808MR-XP-INT	8	2x60kHz 4x10kHz	8	-	Relay	COM1(RS485), COM2(RS485), Type-B USB	/
H0U-0808MRT-XP-INT				2x100kHz	4 x Relay 4 x Transistor		
H0U-1616MR-XP-INT	16	2x60kHz 4x10kHz	16	-	Relay		
H0U-1616MRT-XP-INT				2x100kHz	4 x Relay 12 x Transistor		
H0U-0808MR-XP-6AT-INT	8	2x60kHz 4x10kHz	8	-	Relay		6AT
H0U-0808MRT-XP-6AT-INT				2x100kHz	4 x Relay 4 x Transistor		
H0U-1616MR-XP-6AT-INT	16	2x60kHz 4x10kHz	16	-	Relay		
H0U-1616MRT-XP-6AT-INT				2x100kHz	4 x Relay 12 x Transistor		

Note: The total frequency of high-speed input is limited to 60K.

When the expansion card is built-in, the functions of the expansion card are as follows:

Model	Analog input	Analog output	Temperature
6AT	Voltage: -10 to +10 V Current: 4–20 mA Current: -20 to +20 mA They are switched over via soft component.	Voltage: -10 to +10 V Current: 4–20 mA Current: 0–20 mA They are switched over via soft component.	A total of three terminals are available, supporting 2-channel temperature detection and PT100 and TC detection, which are switched over via soft component.

## A.2 Buttons

In addition to the LCD window on the front of the H0U, there are 25 membrane switch buttons, which have good touch feel, long service life, and safety and reliability. In addition to basic functions, all 25 buttons can be set as special function buttons to directly complete functions such as page jump and switch value setting.

All 25 buttons can be defined by users as specific functions. Such as Bit set, Bit reset, screen jump, etc. If it is not defined as a special function, only basic functions can be performed. Basic functions include resetting the initial page and jumping from the previous page to the next page.

The keys shown in the table below are basic buttons with their own default functions. But the basic keys can also be used as custom keys to perform custom functions through controls. When the default function and custom function of the basic buttons on the same page conflict, you should set the priority.

The priority of the button is set as: register> menu> custom button> alarm> page switching. When there are register controls on the page, the buttons related to the register will execute the register function, not the custom function, even if there is a custom function.

Keys	Button	Basic function description
	ESC	On the default page, press this key to enter the main menu. When an alarm occurs, press this key to return to the page before occurrence of the alarm. In the menu mode or parameter edit mode, press this key to return to the previous operation or discard the current operation.
	SET	When an editable register parameter exists and allows edition, press this key to enter the editing mode. In the parameter editing mode, press this key to stop editing of this parameter and go to the next parameter. If there is no next parameter to be edited, the editing mode will be exited. If there is no editable parameter or the parameters do not allow edition, pressing this key is invalid.
	Down	In the menu control, if there is a cursor line, press this key to move the cursor down to the next cursor line. If a parameter is being set, press this key to increase the value by 1 where the cursor is located.
	Up	In the menu control, if there is a cursor line, press this key to move the cursor up to the previous cursor line. If a parameter is being set, press this key to decrease the value by 1 where the cursor is located.
	Left	If there is a cursor during parameter or item setting, press this key to move the cursor left.
	Right	If there is a cursor during parameter or item setting, press this key to move the cursor right.
	Confirm	In the menu mode with a cursor line, press this key to go to the next-level menu or view parameter information of the selected item. In the parameter editing state, press this key to confirm edition of the parameter and enter the editing state of the next parameter.
	Numbers 0–9	Press these keys to enter the corresponding number when setting parameters.
	+/-	Press this key to set the positive or negative value of the data.
	CLR	Press this key to clear the setting.

## Appendix B: Version Change Record

Time	Version	Changed content
2020-08	V0.0	First edition released