



ISO9001:2015 Quality System Certification

**EMS-MGC043**

Committed To Creating The Best  
Intelligent Control Terminal

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# 1. Product Description

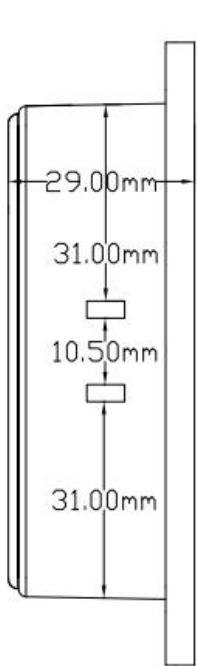
## 1.1 Product Models



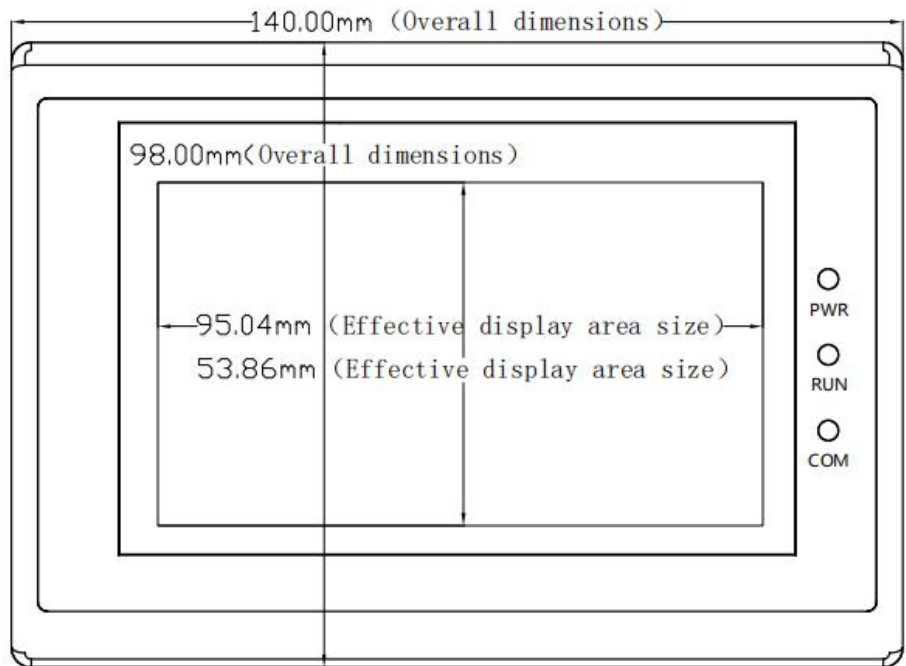
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## 1.2 Products Size

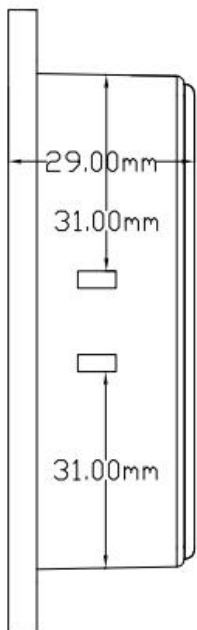
<b>Show Dimensions</b>	<b>Product model</b>	<b>Overall dimensions</b>	<b>Effective display area size</b>	<b>Opening size</b>	<b>Recommended opening size</b>
4.3inch	EMS-MGC043	140*98*29mm	95.04*53.86mm	130*78mm	132*80mm



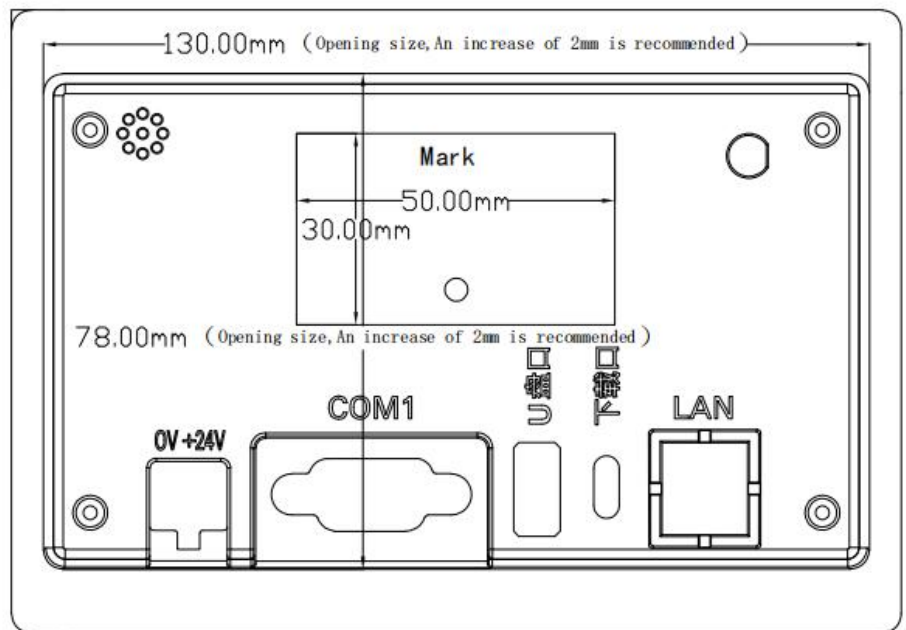
Left view



Front view



Right view



Back view

### 1.3 Products Parameters

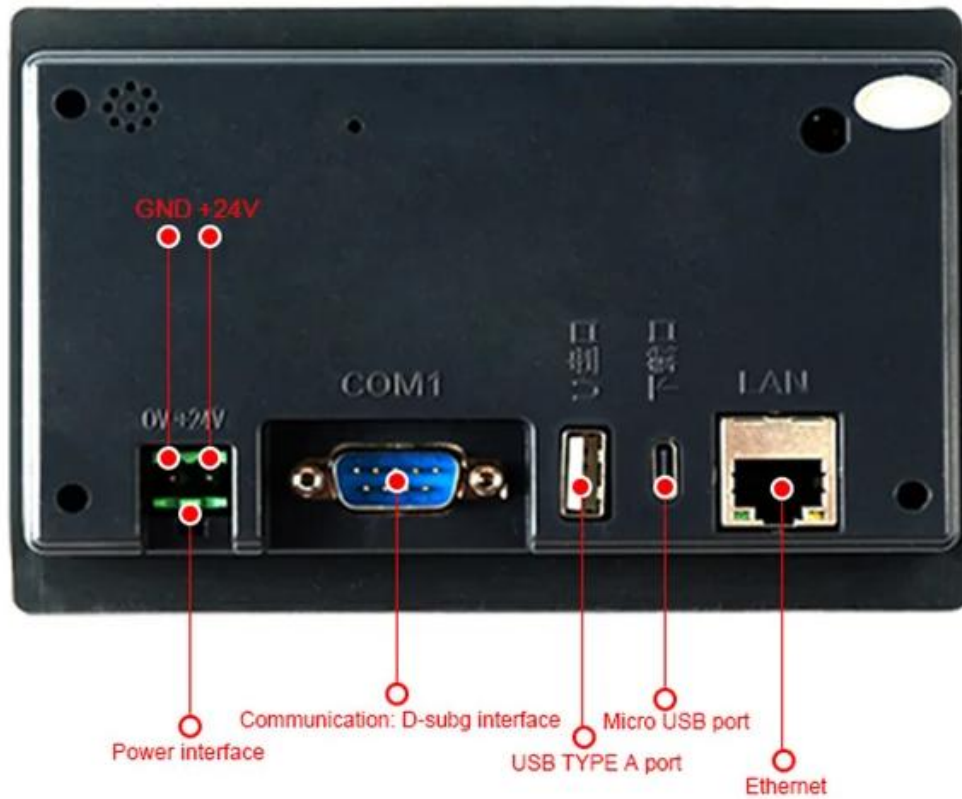
Product Specification		
Hardware	Module	EMS-MGC043

<b>Performance</b>	operating system	LINUX
	Display Size	4.3" TFT LCD
	Resolution ( Px )	480X272
	Colors	16.77M Colors
	Brightness	300 cd/m <sup>2</sup>
	Backlight	LED ( Support backlight adjustment )
	LED life	20000 hours
	Touch screen	4-wire resistive touch screen ( Surface hardness 4H )
	CPU	64-bit ,1GHz Main frequency, with 64MB DDR memory
	Memory	128Mbyte SPI Nand Flash
	RTC	Real-time clock built-in
	Buzzer	Built-in
	Ethernet	Support
	4G Internet of Things	Customized, according to customer requirement
	Audio playback	Customized, according to customer requirement
	I2C External keyboard	Customized, according to customer requirement
	Save power failure data	Support
	USB port 1	USB2.0 Device port (TYPE-C USB upgrade port)
	USB port 2	USB2.0 HOST port (USB flash disk upgrade port)
	Program download method	USB,U disk, Ethernet(Only supported for Ethernet type)
U disk	Support	
Communication port	port 1: RS232, RS485, RS422(three choose one) port 2: RS485	
<b>Electrical Specifications</b>	Maximum power consumption	2W

	Voltage range	DC 19-30V
	Power protection	Have +/-4KV lightning surge protection capability
	The allowed loss of power	<5ms
	CE&ROHS	Comply with EN61000-6-2:2005, EN61000-6-4:2007 standards;Lightning surge+/-4KV,EFT:+/-4KV ; Electrostatic contact discharge +/-5KV ; Electrostatic air discharge+/-5KV.
<b>Environmental Specifications</b>	Operating temperature	-10°C~50°C
	Storage temperature	-30°C~70°C
	Environmental humidity	10~90%RH(non-condensing)
	Vibration	10-25Hz (X, Y, Z direction, 2g/30 min)
	Cooling way	Natural air cooling
<b>The Other Parameters</b>	Protection grade	The front panel conforms to IP65 (with flat plate cabinet installation), and the rear panel conforms to IP20
	Overall dimensions	140*98*29mm
	Effective display area size	95.04*53.86mm
	Opening size	130*78mm
	Recommended opening size	132*80mm
	The weight	207g
	Software	Upper : High_Performance_HMI

## 2. Hardware Introduction

### 2.1 Definition of terminal pin



Port Definitions	
Device Position Number	Descriptions
①	Power interface
②	Serial port 1, serial port 2 communication D-SUB9 interface
③	USB TYPE A port
④	TYPE C USB download port
⑤	Ethernet port

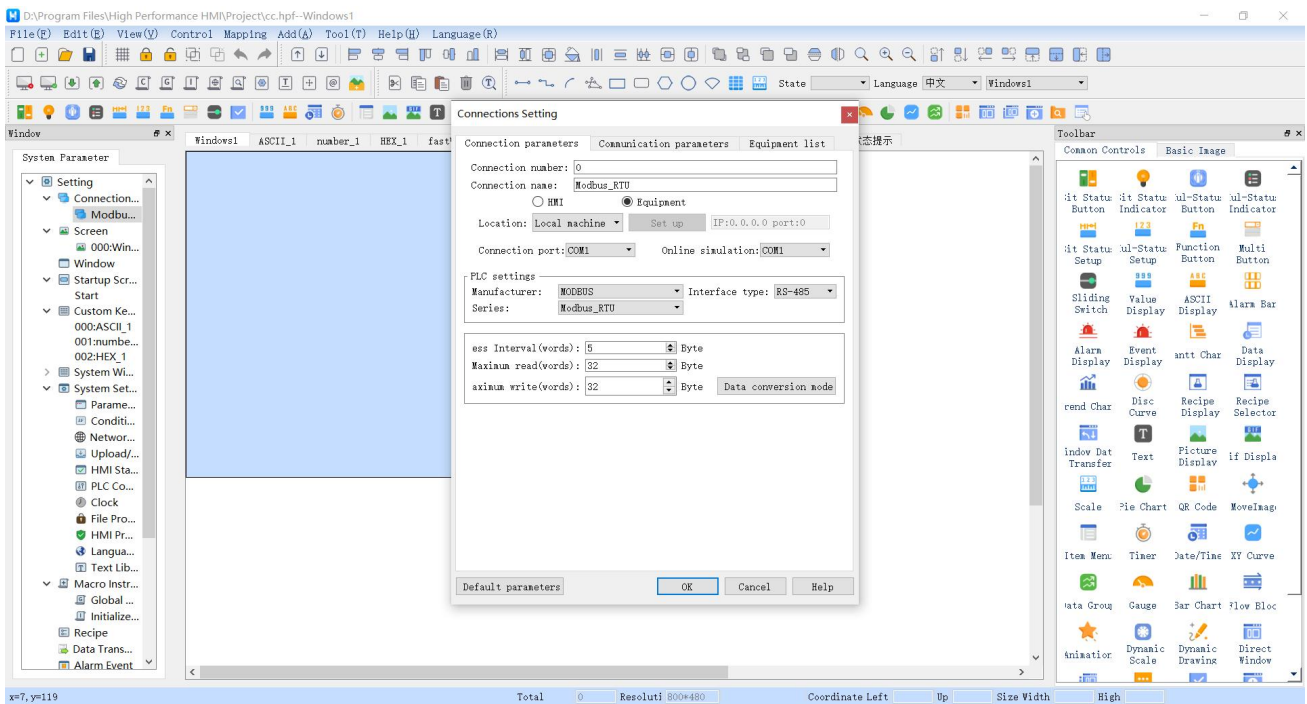
Power supply interface—①		
Pin	Definition	Descriptions
1	DC+24V	Positive input of power supply , DC19 - 30V
2	0V	Negative power input

COM D-sub9 interface—②					
Pin	Definition	Port1 RS232	Port1 RS485	Port1 RS422	Port2 RS485
1					RS485 B(-)
2	RXD	RS232 receiver			
3	TXD	RS232 driver			
4					RS485 A(+)
5	SG	Communication grounding			
6	RX-			RS422 receiver-	
7	RX+			RS422 receiver+	
8	TX-		RS485 B(-)	RS422 driver-	
9	TX+		RS485 A(+)	RS422 driver+	

**Note: Serial port 1 and serial port 2 are on the same DB9 communication interface.**

### **3. Description PC Configuration Software**

#### **3.1 Develop software**



PC Software High\_Performance\_HMI is a tool that users can edit arbitrarily. All application programs are developed based on it. High\_Performance\_HMI composes rich controls, which can be arbitrarily combined to achieve the functions that users want :

**Features Includings :**

<b>elementary school figure</b>	Draw basic graphics such as rounded rectangle, rectangle, polygon, sector, circle/ellipse, straight line, polyline, etc.
<b>Bit Status Button</b>	Read and write operations on bit addresses, with monitoring(Read and Write)
<b>Bit status indicator</b>	Monitor ON/OFF status of bit addresses ( read-only ) .
<b>Multi-state button</b>	Read and write to a word address, with monitoring (up to 256 states). When you click this button, you can write the corresponding status data into the write address. Write address and read address can be set differently or identically ( Read and Write ) .
<b>Multi-state indicator</b>	Monitor the status of word addresses ( read-only ) .
<b>Bit State Settings</b>	Write to bit address, no monitoring ( Write-only ) .
<b>Multi-state</b>	Write to word address, no monitoring function ( Write-only ) .

<b>settings</b>	
<b>Function Button</b>	It includes functions such as picture jumping, formula operation, alarm operation, historical data operation and so on.
<b>Multi-function button</b>	The button can be used to achieve a variety of functions at the same time, including bit state setting, picture jumping, triggering macro instructions, and so on.
<b>Slide switch</b>	Create a slider area to display values, or press the slider to move to change the value of the specified word address.
<b>Numeric Display</b>	Enter or display a value for the specified register address; Includes formats such as BCD/2/16.
<b>ASCII code display</b>	Enter or display the character contents of the specified register address; Supports encoding such as UTF-8, ASCII, Unicode, GB code, etc.
<b>Alarm Bar</b>	Display HMI alert information dynamically in the form of text scrolling. <b>Note: Alarm information should be established in the "Alarm Events" before using this control.</b>
<b>Alarm display</b>	Display HMI alarm information in real time in a tabular form. <b>Note: Alarm information should be established in the "Alarm Events" before using this control.</b>
<b>Event Display</b>	Display HMI instant/historical alarm information in tabular form; Instant/History mode can be set. <b>Note: Alarm information should be established in the "Alarm Events" before using this control.</b>
<b>Event Gantt Chart</b>	After alarm login, when using event Gantt chart, users can better understand the interval and time of alarm occurrence. <b>Note: Alarm information should be established in the "Alarm Events" before using this control.</b>
<b>Data Display</b>	Sampled data collected by saved data is displayed in tabular form in real time/history mode. When displayed in History mode, the data in a certain period of time can be displayed according to the settings. <b>Note: Use this control to set the acquisition address in Data Acquisition first.</b>
<b>Trend Chart</b>	There are two ways to display the sampled data collected by data collection in a continuous line segment: real-time/historical. When the display mode is History, the data in a certain period of time can be

	displayed according to the settings. <b>Note: Use this control to set the acquisition address in Data Acquisition first.</b>
<b>Disc Curve</b>	The sampling data collected from the data is plotted as a curve with the center as the axis. <b>Note: Use this control to set the acquisition address in Data Acquisition first.</b>
<b>Formula Display</b>	Displays the defined recipe records in a tabular manner. <b>Note: Formula must be established before using this control</b>
<b>Formula selector</b>	For selecting the current formula group or for switching the formula group, press for 2 seconds. <b>Note: Formula must be established before using this control</b>
<b>Data Transfer (Window)</b>	When the conditions are met, data from the source address is transferred to the destination address, and you can choose to perform data transmission by either manual/trigger. <b>Note: The control is operational and the address mode transmitted is word address only.</b>
<b>Data Transfer (Background)</b>	Timely transfers data or status from the source address to the destination address. <b>Note: The data transfer is not a control operation, but a global timer, and the address mode of the transfer is word address and bit address.</b>
<b>Text</b>	Displaying text content on HMI allows you to set the content and style of the text (italic, bold, for example)appearance such as text color. <b>Note: To display multiple languages, you need to add corresponding text labels to the Text Library.</b>
<b>pictures displaying</b>	To display pictures, you can switch between multiple pictures according to time or address.
<b>GIF Display</b>	Used to display pictures in GIF format on HMI.
<b>scale</b>	It can be used to match components that require scale display.
<b>Pie chart</b>	Display the proportion of each channel as a pie chart based on the value of the read address.
<b>QR code</b>	By reading/entering data at a specified word address, a two-dimensional code of the corresponding data can be generated in the window for scanning.
<b>Move Graphics</b>	Displays a moving graphic, and the HMI system uses a continuous word address value to determine the location and state of the move.

<b>Project Menu</b>	Displays a list of items for viewing and selecting. When a project is selected, the corresponding values or data are loaded into the monitoring address.
<b>Timer</b>	Through five kinds of action logic, the relevant address can be set to achieve different fixed-time effect.
<b>Date/Time</b>	Used to display HMI system time, date, week.
<b>XY curves</b>	Display coordinate data for X and Y using curves.
<b>Data Groups</b>	Display data for a specific group address using a line chart.
<b>Meter</b>	Use gauges to display values within word addresses.
<b>Bar Chart</b>	Use a column chart to display values within word addresses.
<b>Flow Block</b>	Flow blocks are animated graphics that simulate the flow of liquid in a pipe.
<b>Animation</b>	First draw the moving track of the animation element, move it according to the preset track, and change its state.
<b>Dynamic scale</b>	Dynamic scaling can be used with any element requiring the display of scale symbols.
<b>Dynamic Drawing</b>	Depending on the set number of registers, you can draw lines, rectangles, circles, points, ellipses, ellipses tangent to rectangles, arcs, sectors, long circles and other graphics.
<b>Direct Window</b>	When the bit address specified by the component is triggered, a sub-window pops up on the current HMI screen.
<b>Indirect window</b>	When the specified read word address value is changed, a sub-window pops up on the current HMI screen.
<b>Message Display</b>	Displays the text content based on the numeric value of the specified numeric address.
<b>check box</b>	Multiple buttons can be set in the check box, and the function of simultaneous action of the set buttons can be achieved during operation, which can be divided into [radio] and [multiple selection]
<b>Action Trigger (Window)</b>	Actions added under the control can be performed according to the set trigger mode (enter current picture/leave current picture/background on/background off) [delay/bit state setting/multistate setting/trigger macro command/wait for trigger macro command/screen

	operation/keyboard input/screen capture/confirm all events (alarm)]; A maximum of 10 action groups can be set, each of which is executed in sequence from action group 1 to action group 10. <b>Note: The trigger conditions of this function are to enter the current picture, leave the current picture, turn on the background, turn off the background light, etc.</b>
<b>Motion trigger (background)</b>	Actions added under the control (Delay/Bit State Settings/Multistate Settings/Trigger Macro Instructions/Wait for Trigger Macro Instructions) can be executed when the set trigger mode [idle time/numeric change (bit or word)]; A maximum of 15 groups of actions can be set, with 10 action groups added to each group. <b>Note: This function operates globally and triggers idle time and numerical changes (bits or words).</b>
<b>File Browser</b>	Can be used to display folders and file names in a U drive, so that selected file names can be written to specific addresses

**Extended capabilities of host configuration software :**

<b>Public Picture</b>	Users can shorten the development time of the project by making common configuration functions on public screens whose contents can be displayed on other screens simultaneously.
<b>Public Window</b>	Users can shorten the development time of a project by making common configuration functions available in public windows whose contents can be displayed in other windows simultaneously.
<b>Splash Screen</b>	Users can customize the screen displayed by the boot-up logo.
<b>Custom Keyboard</b>	When users need to use their own defined keyboard functions and styles, they can set their own keyboard through the combination of function key elements, numeric elements, character elements, pictures, text, etc.
<b>System Window</b>	Users can make system window calls through function buttons.
<b>Parameter Settings</b>	Set HMI properties (HMI series, HMI model, display mode), general properties (initial window number, screen saver settings, quick selection window, etc.), system (auto logoff, sound control, watchdog), user password (general mode, advanced mode), system information, etc.

<b>Conditional Settings</b>	Set bitwise logic or word logic, which can be used for multi-condition alerts and permission settings [Use Control].
<b>Network Settings</b>	When using Ethernet communication, set the IP address [static IP/DHCP], subnet mask, default gateway, etc. of the HMI native machine here. Note: DHCP is not recommended for slave stations.
<b>Up/Download Settings</b>	Set up the upload/download mode [USB/network], where you can set whether to use the upload password.
<b>HMI status</b>	Checked HMI information (current picture number, current formula number, current user level) will be written to the specified register
<b>PLC control</b>	This function can control HMI to switch basic windows, data writing devices, PLC control, backlight control and so on.
<b>Clock</b>	Functions such as downloading system clock to HMI/writing time to PLC/synchronizing with PLC time can be set.
<b>File Protection</b>	Whether the project needs to be opened by entering a password to verify it.
<b>HMI protection</b>	HMI can be used normally for a certain period of time. If the time exceeds the time specified by the user, HMI will jump to the specified screen previously set by the user. In the specified screen, the user will only place "HMI protection unlock" under the function button.
<b>Language Settings</b>	Supports 10 languages: default (Chinese, English, Russian, Spanish, Japanese, German, Italian, French, Arabic, Korean.) Note: Users are free to edit and modify languages.
<b>Text Library</b>	When a control needs to use labels in the [Text Library], you can add labels to the [Text Library] and set corresponding states and different language text, and add languages to the [Language Settings] when you need to add new languages.
<b>Macro Instructions</b>	Support C language programming, to achieve a variety of more complex logic or functions, can call edited macro instructions through buttons, pictures, global, initialization and action triggering.
<b>formula</b>	Create menus similar to prescriptions; Users can create multiple sets of recipes, which can be switched or downloaded to the registers of the controller according to their needs. The formula element supports data types such as 16-bit integer/positive integer, 32-bit integer/positive integer, 16-bit/32-bit BCD code, 16-bit/32-bit Binary, 16-bit/32-bit Hex, 32-bit floating point number, ASCII code string, UNICODE string,

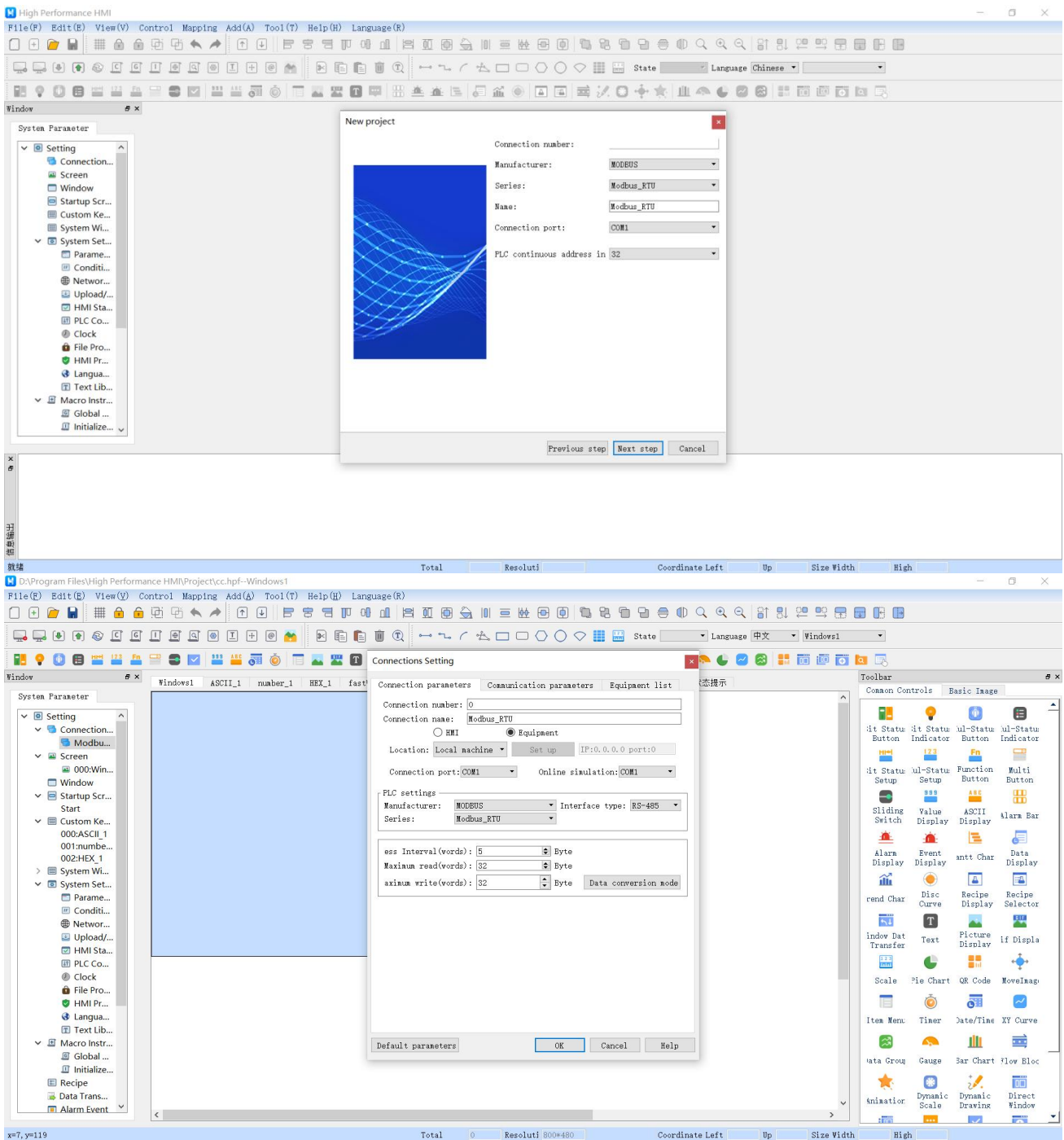
	and so on. <b>Note: 10 formulations are currently supported, each supporting 100 formulation lengths and 999 elements.</b>
<b>Data acquisition</b>	Data can be collected in real time/history, trigger mode can choose periodic/trigger, the collected data can be displayed in data display, trend diagram and disc curve diagram, or the collected data can be saved in U disk. <b>Note: 1. Data collection supports a maximum of 64 groups, each group supports a maximum of 128 channels. When the channels are greater than 64, the maximum number of data collections is 24,000, and the other maximum is 86400; 2. When historical collections are saved to U disks, only U disks with standard FAT32 format less than 32GB are supported, and U disks with larger than 32GB are not supported, forcing modification of the file system to be unsupported with FAT32.</b>
<b>Alarm events</b>	Login for alarm information, you can set the alarm level [low, medium, high, emergency]. The alarm type can be set to bit alarm, word alarm and multi-condition alarm. When the alarm is triggered, you can view the alarm information in the alarm bar, alarm display, event display and Gantt chart. You can also save the historical alarm in the U disk. <b>Note: 1. The maximum number of alarm logins is 5000, and the number of historical alarms is 30000. 2. When historical alarms are saved to U disks, only U disks with standard FAT32 format less than 32GB are supported, and U disks with larger than 32GB are not supported, forcing modification of the file system to be unsupported with FAT32.</b>
<b>Schedule</b>	Sets the state of a bit address to ON or OFF at a specified time, or writes a value to a word address.
<b>Data Synchronization</b>	Data synchronization enables data exchange between two serial ports of the touch screen [word address, bit address, bit of word].
<b>Formula import export</b>	Formula import/export can export existing formulas to the U disk or import formulas from the U disk into the formula database.
<b>Offline Simulator</b>	Before downloading pictures to devices in HMI, you can use High_Performance_HMI own offline simulation function to check the correctness and effect of the configuration pictures.
<b>Online simulation</b>	Online simulation allows you to communicate through your personal computer (High_Performance_HMI configuration software needs to be

	installed first) and related devices such as PLC without using HMI.
<b>Supports multiple controller communication protocols</b>	It is applicable to various PLC, frequency converter, servo controller, single chip microcomputer control system, etc. (Mitsubishi, Panasonic, Omron, Delta, Xinjie, Fatek, Siemens, Keyence, LG, modbus, user-defined and other communication protocols) When users operate, they only need to directly select and call on the software
<b>Custom Add Gallery</b>	Custom add gallery is supported, users can intercept their favorite pictures and load them into the custom gallery to invoke.
<b>keyboard</b>	Support Chinese and English keyboard input, users can switch to use freely.
<b>gallery</b>	The gallery is rich, supports Png, Jpg, Gif, Bmp and other formats of pictures, vector gallery, and any scaling without jaggging.
<b>Baud Rate Range</b>	Support baud rate range 1200-230400 bps.

### 3.2 Protocol Configuration

Users can run MODBUS RTU, Mitsubishi, Siemens, Delta, Xinje and other protocols through the configuration of the upper computer.

Open High\_Performance\_HMI configuration software and click on new project to select the desired communication protocol in new project. Open the protocol under the connection settings to make changes. The diagram below.



## 4. Reliability Test

All products of company have carried out a series of reliability tests before mass production, including ESD test, high and low temperature aging test, EFT and so on, to ensure the quality of products.

## 4.1 ESD Test



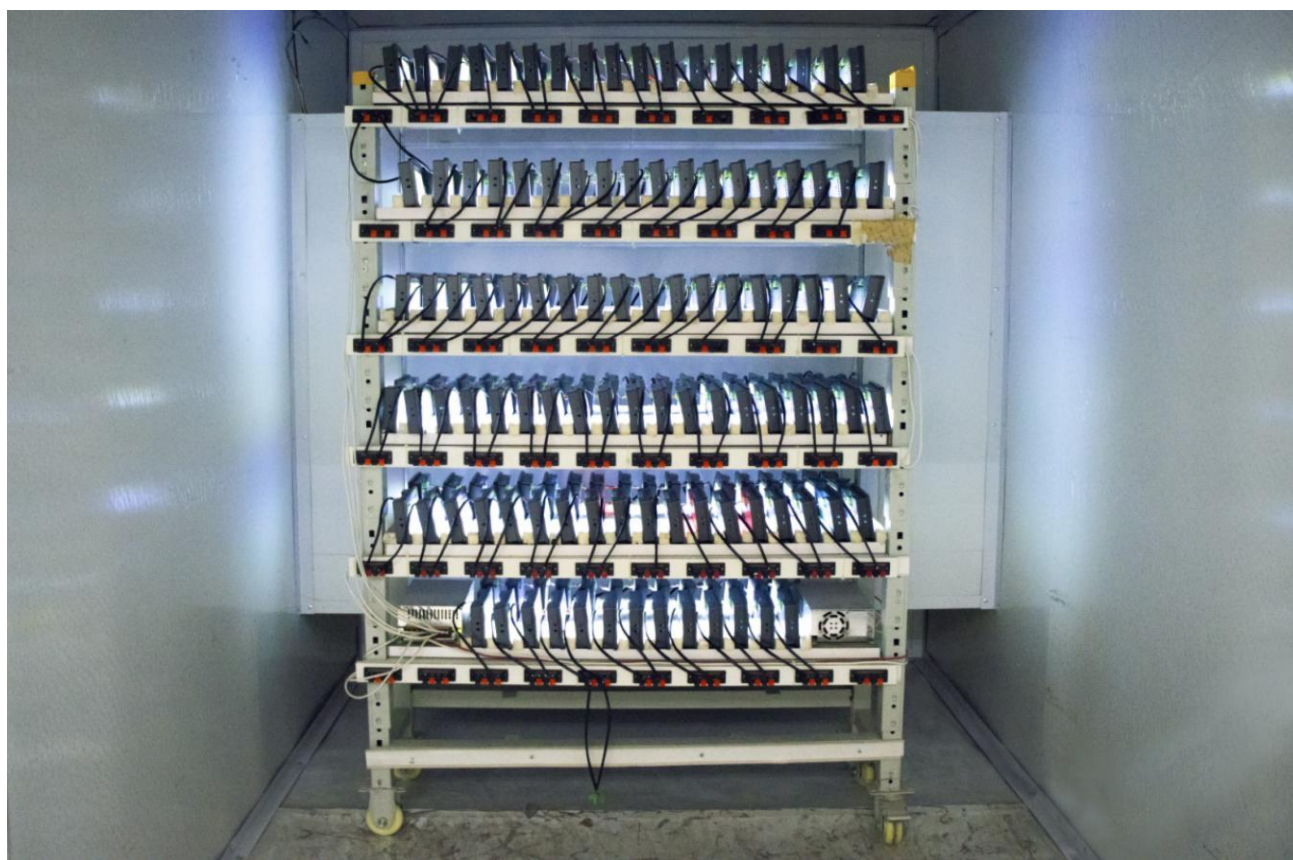
Execution standard : IEC 61000-4-2

Test process: Lay the product flat on the test table, and conduct contact and air discharge in turn around the touch screen iron buckle and the display area, as showing above. Check the screen is weather reset and displayed abnormally.

### Testing Data

Product Models	Discharge type	Discharge value	Test Results
EMS-MGC043	Contact	+/-5KV ;	No reboot, system halt or Abnormal display. Function is normal
	Air	+/-5KV ;	No reboot, system halt or Abnormal display. Function is normal

## 4.2 High low Temperature Aging Test



Test Environment: high and low temperature aging test box

Test Temperature: -10° to 50°

Test Process: Place the product in the high and low temperature aging test box. Through 50° high temperature, -10° low temperature, high and low temperature alternating transformation aging test. Observing the product whether resets ,restarts and shows abnormal display, abnormal function, and other phenomena during the test process.

### The Test Data

Product model	The temperature	Humidity	The test results
EMS-MGC043	The high temperature of 50 °	60%	No reboot, system halt or Abnormal display. Function is normal
	Low temperature - 10 °	60%	No reboot, system halt or Abnormal display. Function is normal
	Alternating high and low temperature (-10°~50°)	60%	No reboot, system halt or Abnormal display. Function is normal

## 4.3 Electrical Fast Transient test



Implementation Standard :IEC 61000-4-4

Test Process: Lay the product flat on the test bench and supply power to the screen through the pulse group generator, coupling pulse group. The diagram above. Check the product whether resets, restarts, and shows abnormal display on the screen.

## 4.4 Lightning Surge Test



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