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# Chapter 1 General Information

## 1.1 Introduction

MT6000 Touch Panel HMI is the new generation of HMI products bearing the feature of openness presented by Kinco Electric Ltd. It features a powerful PXA270 processor and preloaded Windows CE 5.0 embedded operating system. The versatile connectivity options and flexible expansion options make it suitable for industrial operator interface, logic controller and many other applications.

## 1.2 Technical Specification

### 1.2.1 System

CPU: PXA270 520 MHz

DRAM: 64MB SDRAM

ROM: On - board 32MB NAND Flash

Removable Storage: 1 SD card slot

Ethernet: Davicom DM9000 Controller, supporting IEEE802.3 standard

### 1.2.2 Interfaces

Serial: 2 RS232/485/422 configurable ports, DB9 male and female socket respectively

USB: 1 USB1.1 Client, 2 USB1.1 Host (1 Host on MT6300)

Ethernet: 1 10/100M, RJ45 socket

Audio output: 1 3.5mm Line - out port for earphone or speaker

Fieldbus port (Optional): 1 CANopen, DB9 female

### 1.2.3 Storage

On - board 32MB NAND Flash, one standard SD card slot and 2 USB1.1 Host ports (1 on MT6300). System image file is stored on the flash, user application and data file can be stored on Flash, SD card or USB memory devices.

### 1.2.4 Environmental Requirements and Protection

#### Protection Level

IP65 on the front panel, IP20 on the other sides

## Environmental Rating

Type	MT6300T	MT6400T	MT6500T
Operation Temperature	- 10 - 70°C	0 - 45°C	
Storage Temperature	- 20 - 75°C	- 10 - 60°C	
Humidity	RH 10% - 95%, non - condense		
Vibration	10 - 25 Hz (X, Y, Z directions 2G/30min)		

## 1.2.5 LCD Parameters

Type	MT6300T	MT6400T	MT6500T
Display	TFT LCD	TFT LCD	TFT LCD
Diagonal Size	5.7"	7.7"	10.4"
Resolution	320*240	640*480	640*480
Number of Colors	65536	65536	65536
Brightness	500cd/m <sup>2</sup>	350cd/m <sup>2</sup>	400cd/m <sup>2</sup>
Contrast Ratio	400:1		
MTBF of Backlight	50,000 hrs ca.	50,000 hrs ca.	50,000 hrs ca.

## 1.2.6 Touchpad Parameters

Touchpad Technology	4 - wire resistance touchpad
Resolution	1024*1024
Durability	100,000 times

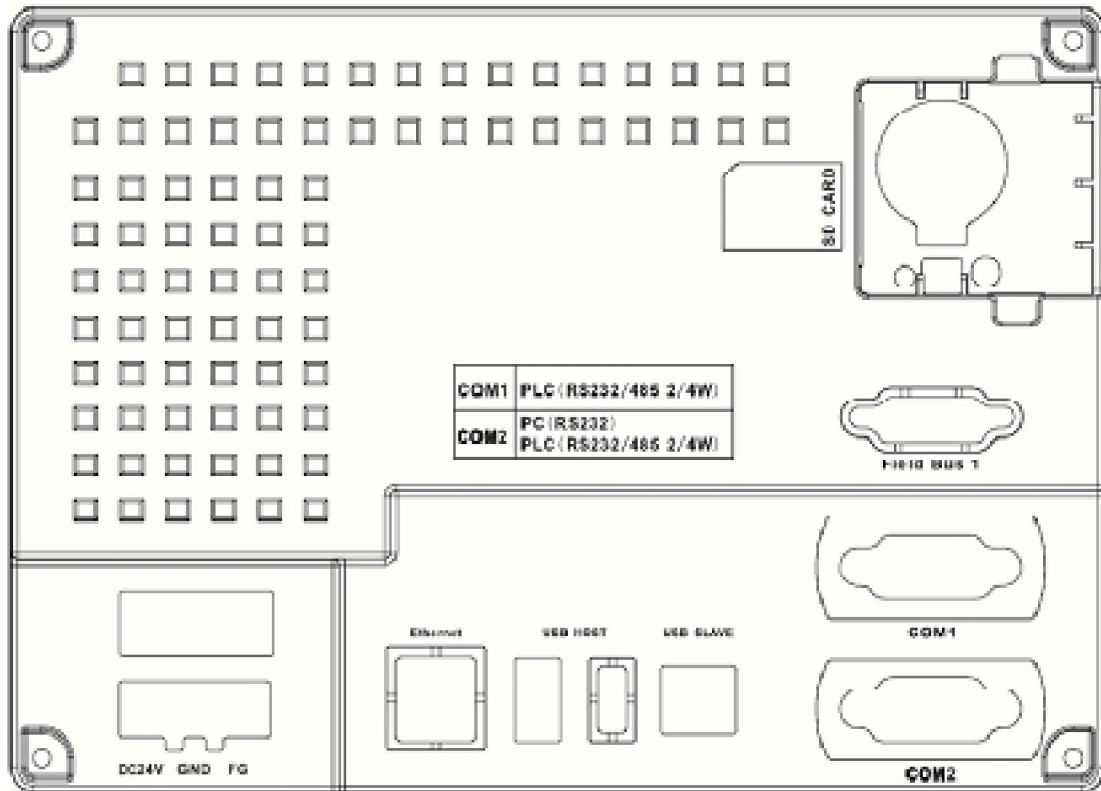
## 1.2.7 Power Rating

Input Voltage: DC 24V ±15%

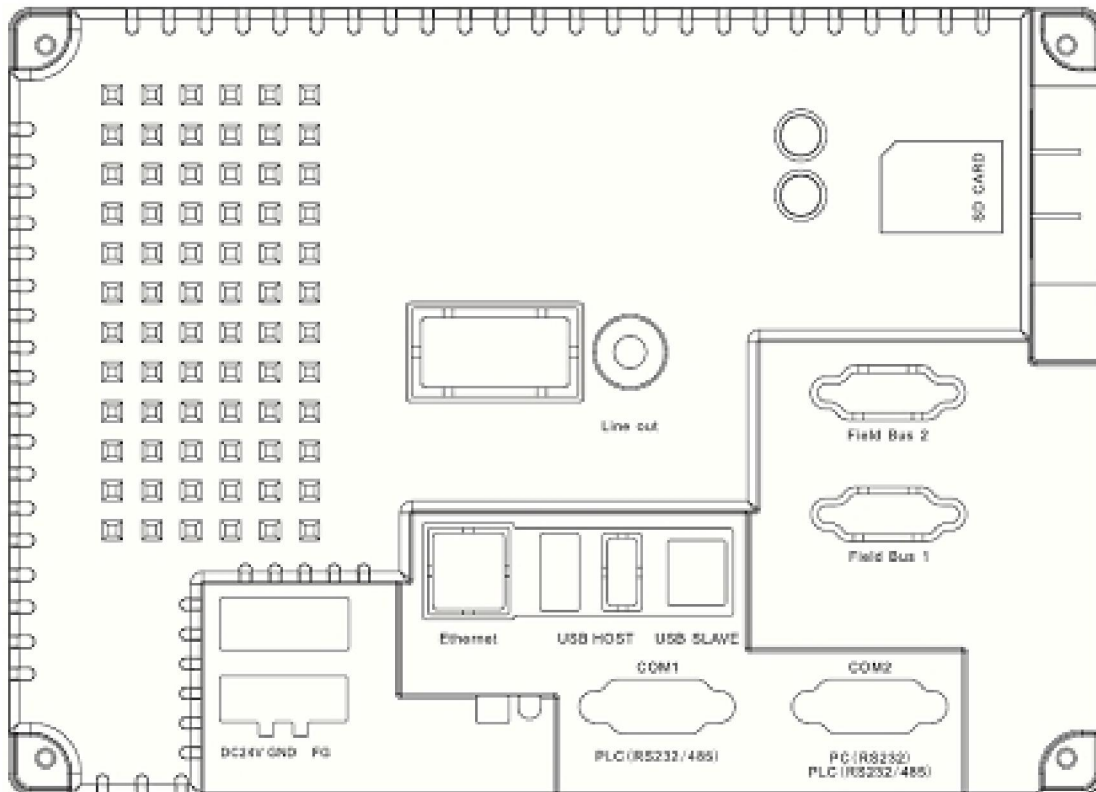
Input Current: 600mA (Startup) /400mA (Operation)

## 1.3 Interface Layout and Description

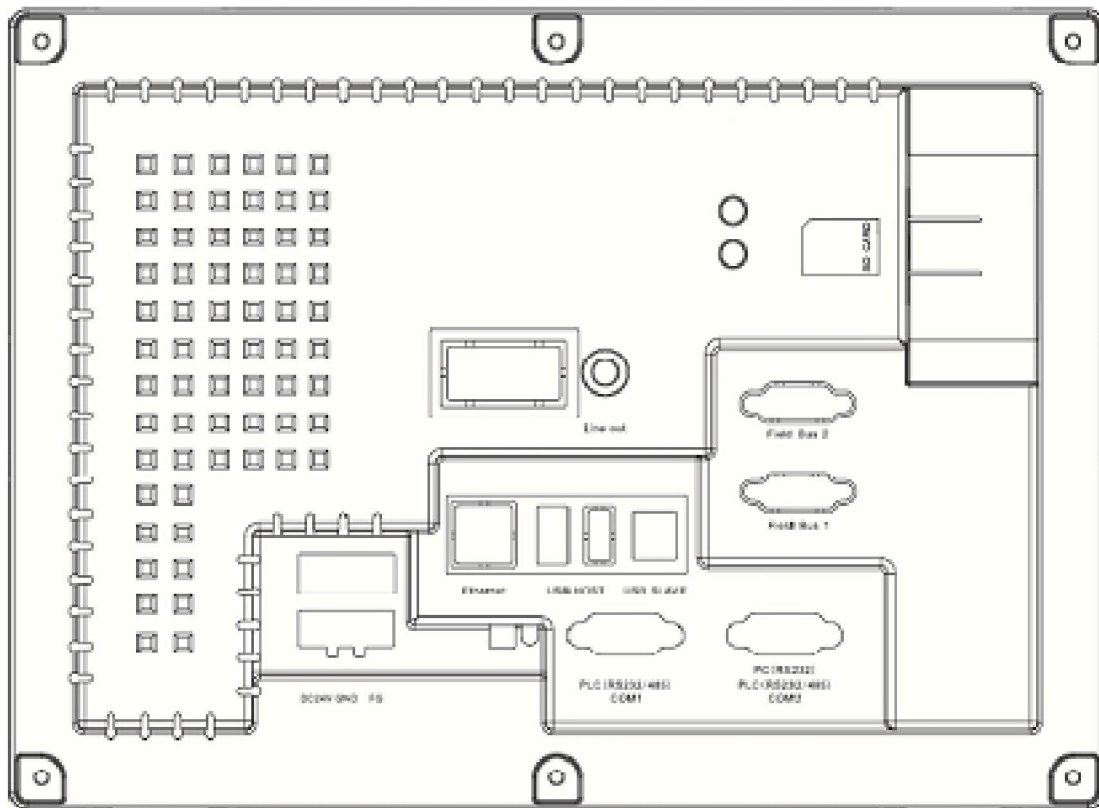
On the back of a basic type of MT6000 panels, there are 2 serial ports (COM1 and COM2), 1 RJ45 Ethernet Socket, 2 USB - A ports (Host), 1 USB - B port (Client) and 1 audio output ports. The layout of the interface ports is shown on the figures below.



MT6300 Interface Layout



MT6400T Interface Layout



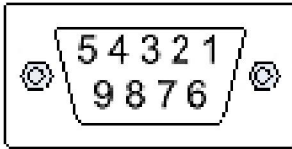
MT6500T Interface Layout

## COM1

	<p>COM1 port of MT6000 is a serial port with full data and control terminals; it can be configured as an RS232, RS485 or an RS422 port for exchanging data with field device like PLC. Also, COM1 is used for connecting to a desktop PC for downloading program and system commissioning. COM1 is a DB9 male socket, the pin assignment and description is listed in the table below.</p>
--	--

Pin#	Signal	RS - 485 4 - wire	RS - 485 2 - wire	RS - 232(PLC)	RS - 232(PC)
1	Rx - (A)	RS485 Rx	RS485A		
2	RxD_PLC			RS232 Rx	
3	TxD_PLC			RS232 Tx	
4	Tx -	RS485 Tx			
5	GND	Signal Ground			
6	Rx+(B)	RS485 Rx	RS485B		
7	RxD_PC				RS232 Rx
8	TxD_PC				RS232 Tx
9	Tx+	RS485 Tx			

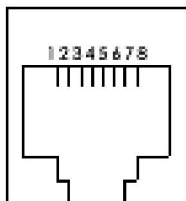
## COM2



The COM2 port of MT6000 is almost the same as COM1. The main difference is that in RS232 mode, COM2 cannot be used for connecting to desktop PC. Those pins are assigned to the hardware control signal CTS and RTS. COM2 is a DB9 female socket. The pin assignment and description is listed in the table below.

Pin#	Singal	RS - 485 4 - Wire	RS - 485 2 - wire	RS - 232(PLC)
1	Rx - (A)	RS485 RxD	RS485A	
2	RxD_PLC			RS232 RxD
3	TxD_PLC			RS232 TxD
4	Tx -	RS485 TxD		
5	GND	Signal Ground		
6	Rx+(B)	RS485 RxD	RS485B	
7	CTS_PLC			Clear to Send
8	RTS_PLC			Ready to Send
9	Tx+	RS485 TxD		

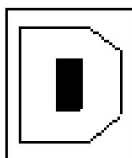
## Ethernet



RJ45 socket, pin assignment listed below:


1	Tx+	5	NC
2	Tx -	6	Rx -
3	Rx+	7	NC
4	NC	8	NC

## USB-Client




USB - B port for ActiveSync connection, please use a USB A - B cable for connection

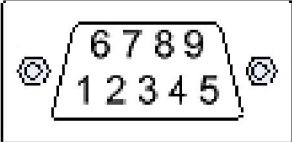
## USB-Host

	USB - A port, plug USB memory stick, printer, mouse and keyboard here
---	---

## Line-out

	Standard 3.5mm audio output, plug speaker or earphone here
---	--

## Fieldbus 1 (Optional)

 <p style="text-align: center;">CAN</p>	<p>Fieldbus 1 port is an optional fieldbus expansion port. For CAN interface, it is a DB9 female socket. The pin assignment is listed below:</p> <table border="1" data-bbox="655 1263 1345 1491"><thead><tr><th>Pin#</th><th>Signal</th><th>Description</th></tr></thead><tbody><tr><td>2</td><td>CAN_L</td><td>CAN_L bus line dominant low</td></tr><tr><td>3</td><td>CAN_GND</td><td>Signal Ground</td></tr><tr><td>7</td><td>CAN_H</td><td>CAN_H bus line dominant high</td></tr></tbody></table> <p>Other pins have no internal connection (NC) .</p>	Pin#	Signal	Description	2	CAN_L	CAN_L bus line dominant low	3	CAN_GND	Signal Ground	7	CAN_H	CAN_H bus line dominant high
Pin#	Signal	Description											
2	CAN_L	CAN_L bus line dominant low											
3	CAN_GND	Signal Ground											
7	CAN_H	CAN_H bus line dominant high											

Except for the CAN interface, Fieldbus 1 can be configured as a Profibus - DP slave port or other fieldbus interface, the detailed specification is available in the respective product documents. Please refer to the specific product document or consult the technical staff of Kinco.

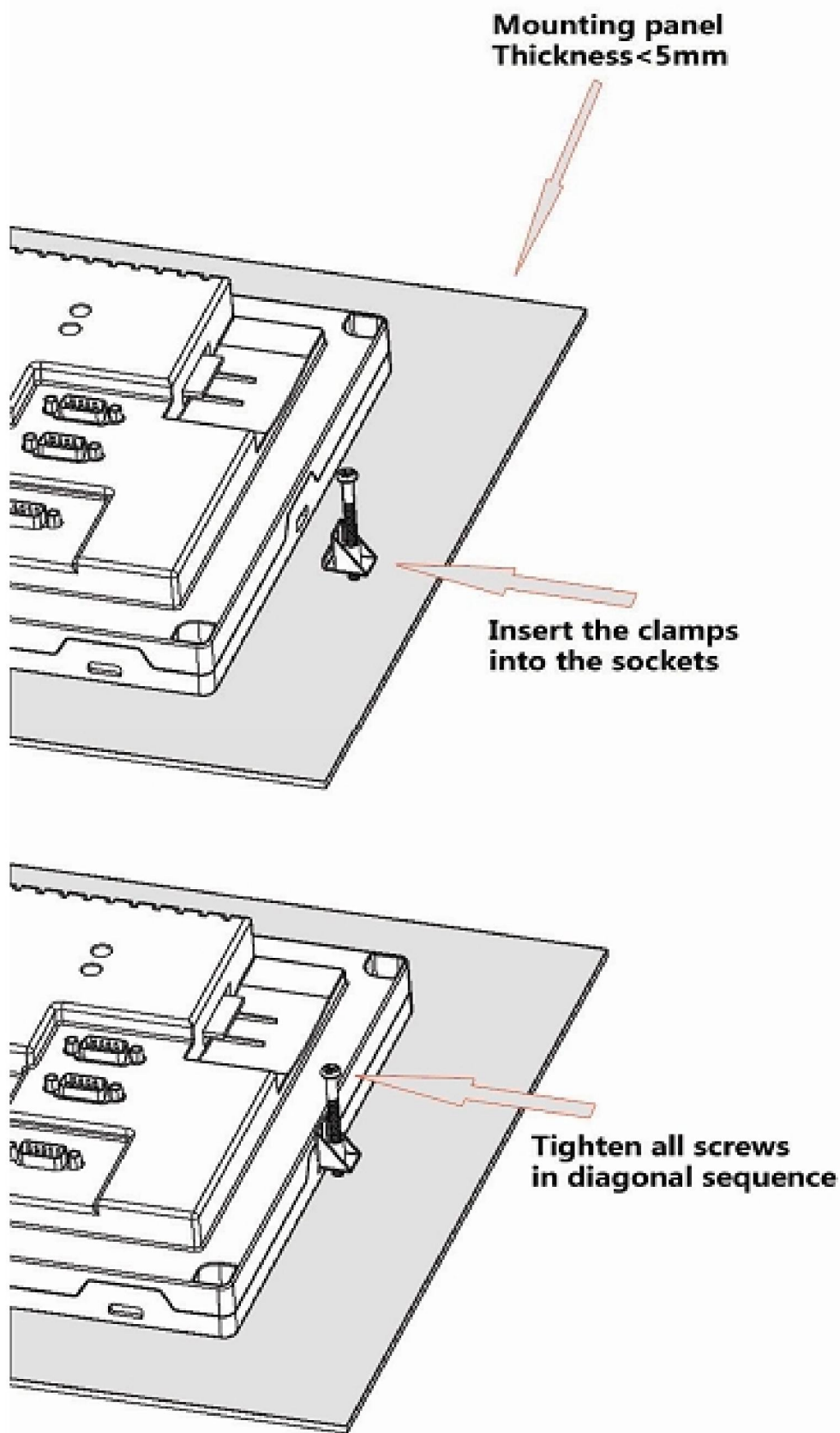
## Chapter 2 Installment

### 2.1 Install MT6000

MT6000 can be mounted on flat surface of operation panel or control cabinet. The clamps for mounting are provided within the package. Cut a hole according to the cutout size depicted

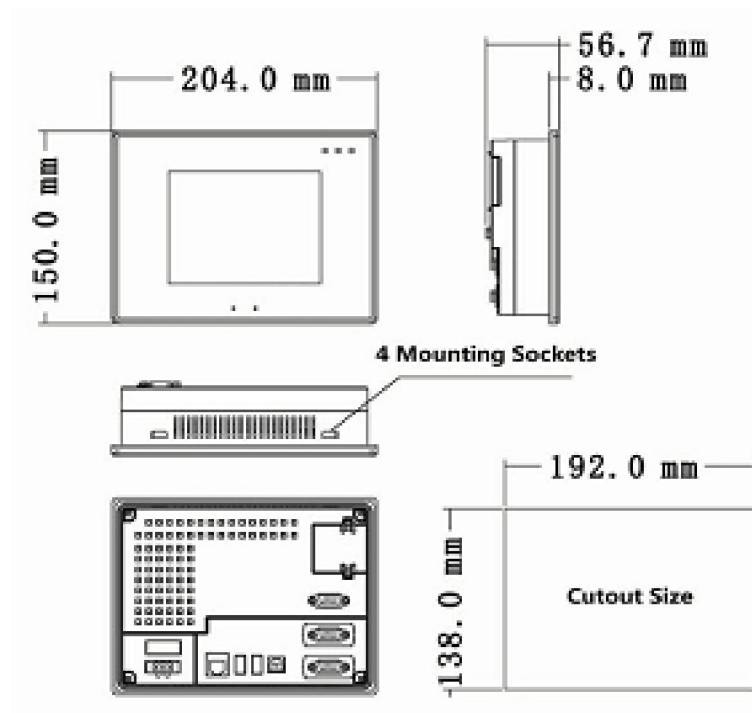


below, trim and clear the edge of the hole. Insert MT6000 into the hole. Please make sure the rubber sealing ring circling the HMI is in proper position and clean. Insert the clamps into the sockets on the side of the HMI and tighten the screws in diagonal sequence until the HMI is firmly fixed and the sealing ring contacts the mounting surface well. Proper cutting and mounting will ensure the surface where MT6000 is mounted has the protection level of IP65.

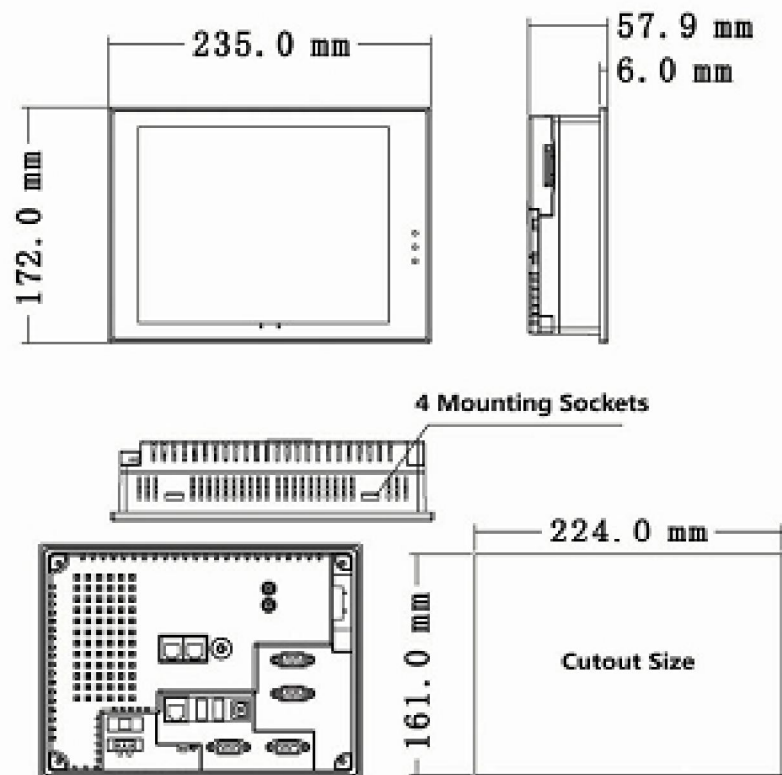


MT6000 mounting instruction

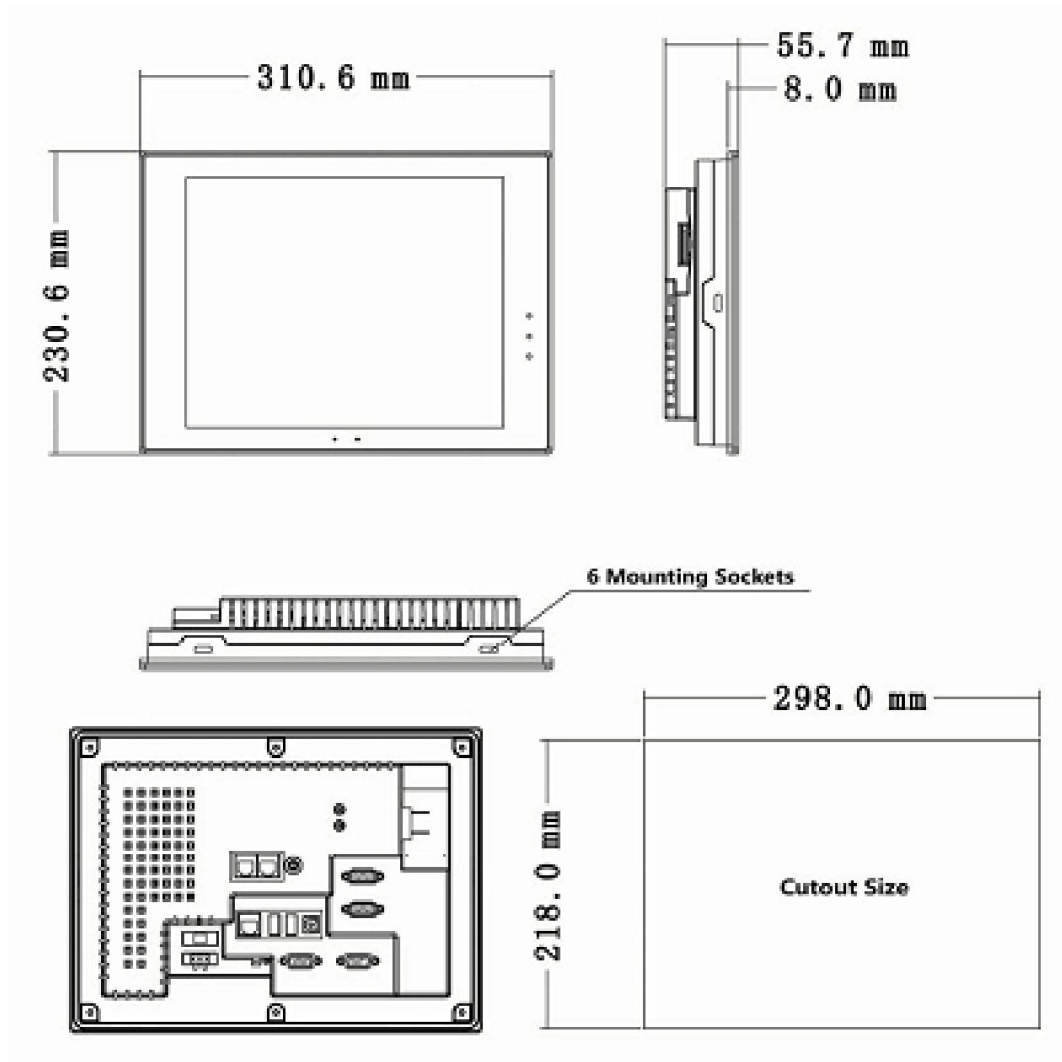
## Dimension and Cutout size



MT6300




MT6400



MT6500

## 2.2 Power Connection



24V GND FG

The power supply socket is depicted on the left. Please use the plug within the package for power connection.

Terminal	Description
24V	DC 24V power supply Positive
GND	DC 24V power supply Negative
FG	Floor Ground, grounding terminal

Please use appropriate DC 24V power supply for MT6000. MT6000 has internal power protection measures against reverse polarity or over voltage events. However, the user should **always** check and confirm the power connection is correct before switching on. Please make sure that MT6000 is not sharing the same DC power supply with any inductive load or the input circuit of a PLC. There is a fuse slot above the power socket. The proper fuse is 20mm\*5mm, rated 1A 250V. A

backup fuse is provided within the package for replacement. Please make sure you use the fuse with the same specification to replace the used one.

## **2.3 EMC Guidance**

MT6000 has passed the test for CE certification and has reliable EMC performance. However, there are lots of sources of electro - magnetic interference which could affect the operation of MT6000 or other devices. Compliance to some very basic EMC principles will greatly reduce the possibility of the malfunction.

### **Grounding**

Please connect the FG terminal of the HMI to the metal chassis or grounding point of the field. We recommend a direct connection between the FG terminal and the grounding point using low impedance AWG14 wire. Please make sure that the connection is firm and short.

### **Shielding**

Use shielded cable for the communication and signal cable which are vulnerable to EMI. Note that the shield should cover the full length of the cable and be properly grounded at both ends of the cable.

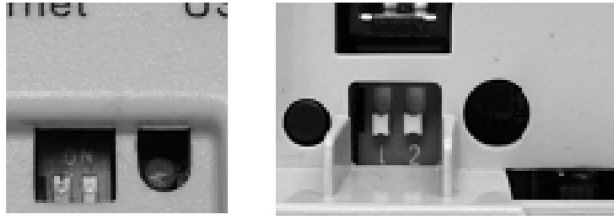
### **Good Wiring**

Please separate the cable of high voltage and lower voltage, the power cable and signal/communication cable when wiring in the cabinet. Please keep those cables vulnerable to EMI away from devices such as contactor, starter and relay.

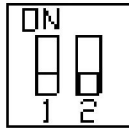
## **Chapter 3 System Tuning**

### **3.1 Encoder switch**

There is a 2 - bit encoder switch on the back panel of the HMI. On MT6300, the switch is hidden under the covering lid on the upper right of the back. The mapping of the switch status and function is listed below. Setting of the mode will take effect after push the black button next to the switch to reset the HMI.



Encoder switch and reset button on the back of MT6000 (the right picture is MT6300)

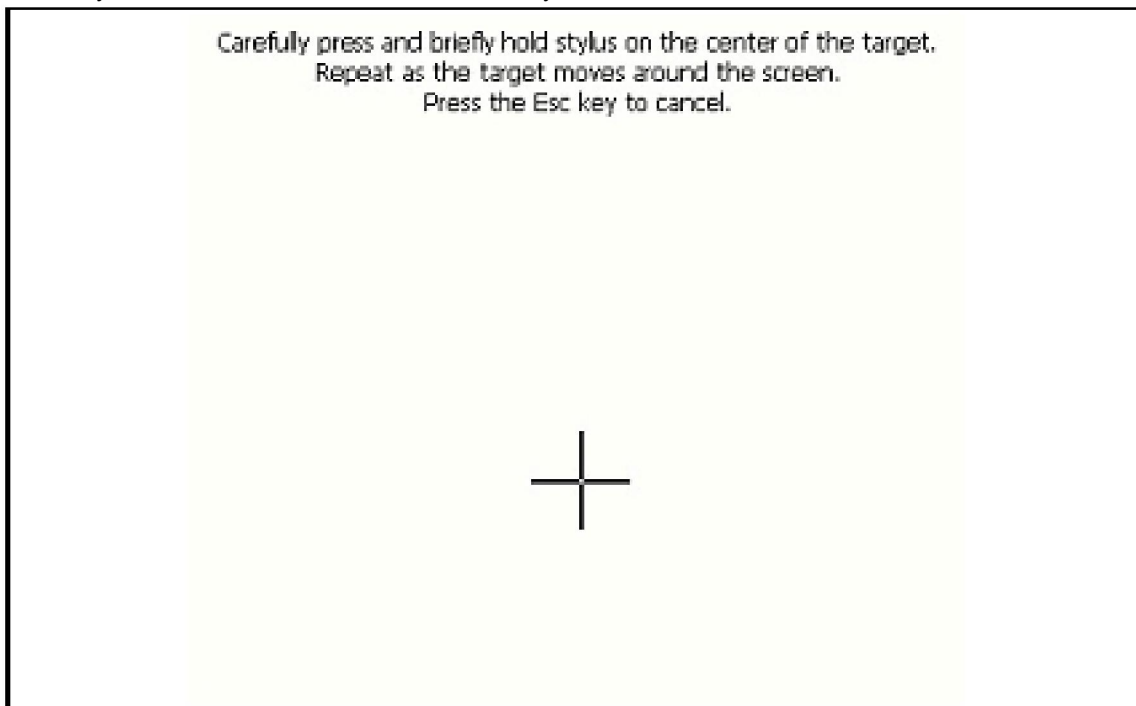


SW1	SW2	Operation Modes
OFF	ON	Touch screen calibration
ON	OFF	Firmware update or recovery
OFF	OFF	Normal operation

Notes: After the touch screen calibration or firmware management is finished, please make sure that the switch is set to normal mode (Off, Off).

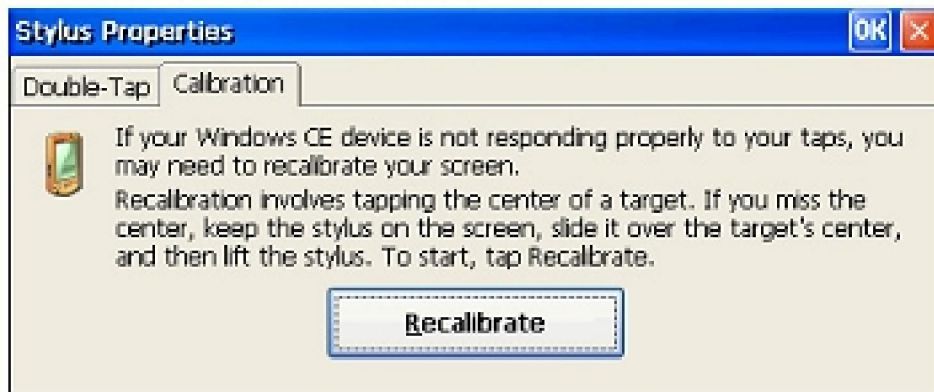
### 3.2 Touch screen calibration

The touch screen of MT6000 needs to be calibrated when the HMI is power on for the first time. Please set the encoder switch of MT6000 to (Off, On) then reset the HMI to enter the calibration. The interface for calibration is shown as the picture below, use an object with a small tip (i.e. touch pen) to tap the centre of the cross cursor and hold, the cursor will automatically move to the four corners and finally go to the centre of the screen. Repeat the "tap - hold" procedure until the cross cursor disappears. Then the system will prompt that the calibration has successfully completed. Tap anywhere on the screen to exit the calibration. Set the switch to normal mode (Off, Off) and restart the HMI. The system will save the touch screen parameters in non - volatile memory and there is no need to re - calibrate very often.



The performance of the touch screen is heavily dependent on the character of the touch component, which may vary because of the environmental shifts during a long period. Thus the accuracy of the touch screen may be lower than before. Re-calibrate the touch screen in the same procedure described above could solve this problem.

Another method to enter the calibration program is using the Control Panel of the Windows CE operating system. It is suitable for panels already mounted on the cabinet. Please refer to Chapter 4 for the detail of Control Panel setting.



### 3.3 LCD Brightness setting

The brightness of the LCD of MT6000 could be adjusted using the software Toolkit preloaded on MT6000. Refer to Chapter 5 for detail.

## Chapter 4 Windows CE

### 4.1 WinCE Basics

Windows CE is an operating system which has the graphic user interface (GUI) similar to the desktop version of Windows operating system. With USB mouse and keyboard, the user can manipulate MT6000 in the same way as a typical windows desktop PC. However, the application program running on desktop Windows system cannot be used on a Windows CE platform. The installation/uninstall of software program is a little bit different on the two platforms.

The picture below shows a "desktop" of a MT6000 panel.

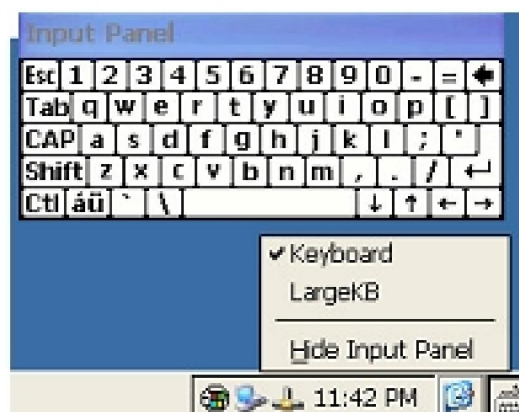


Desktop of MT6000

The user can tap the touch screen instead of using USB mouse or keyboard. Single tap has the same effect of single click on the left button of the mouse. Double taps has the same effect of double click.

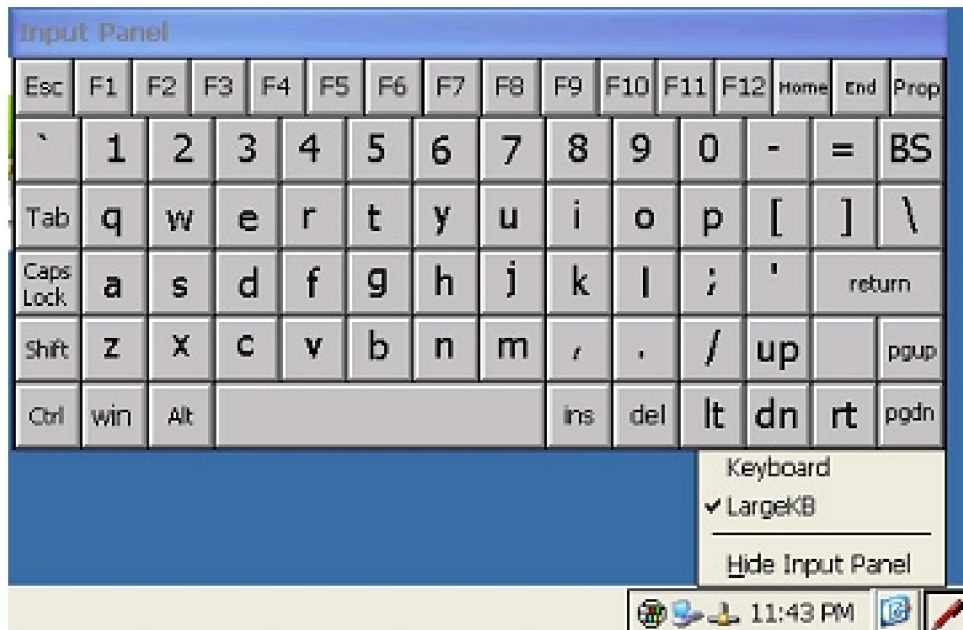
#### 4.1.1 Virtual keyboard

The user can use the built - in virtual keyboard to input characters or digits. By default, the virtual keyboard is hidden after start - up. Tap the edit box will automatically invoke the keyboard. Tapping the "Hide Input Panel" option will hide the panel again. As the picture shows, the user could choose from two kinds of keyboards: largeKB and Keyboard.



Standard keyboard

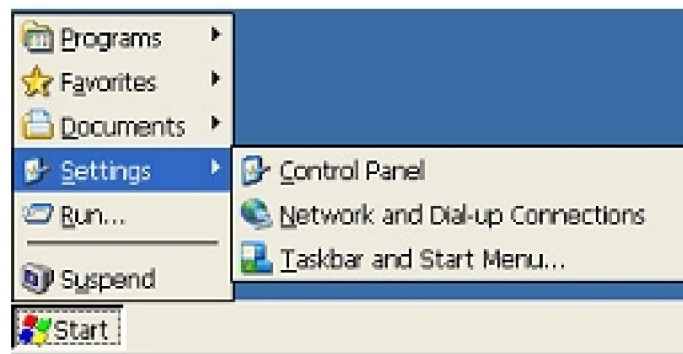




Large keyboard

### 4.1.2 Control Panel

Like the desktop version Windows, most of the settings related to system parameters are grouped in the Control Panel. To enter the Control Panel, tap "Start" ->"Settings" ->"Control Panel".



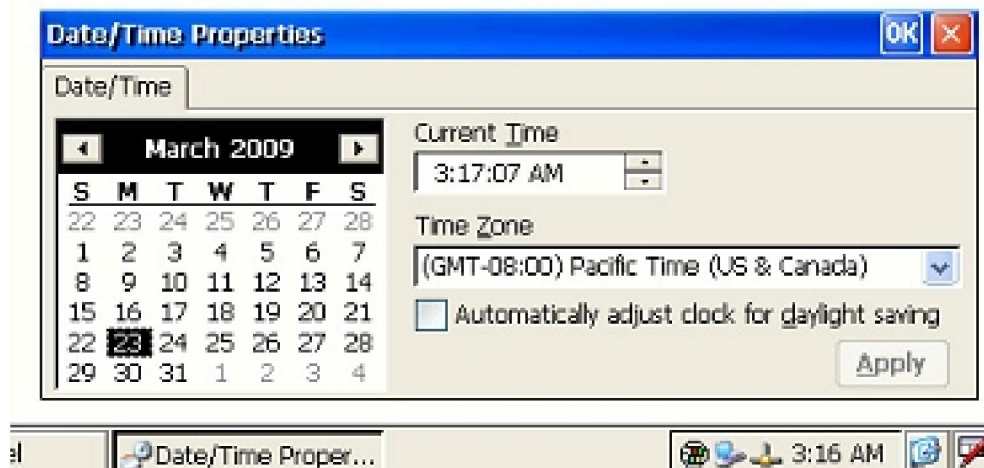
### 4.1.3 Regional and Language setting

The user can select English or Simplified Chinese as the language of menu and interface. The default setting is English. To switch to other language, enter "Control Panel" ->"Regional and Language setting" and select from the dropdown list.



#### 4.1.4 Time adjustment

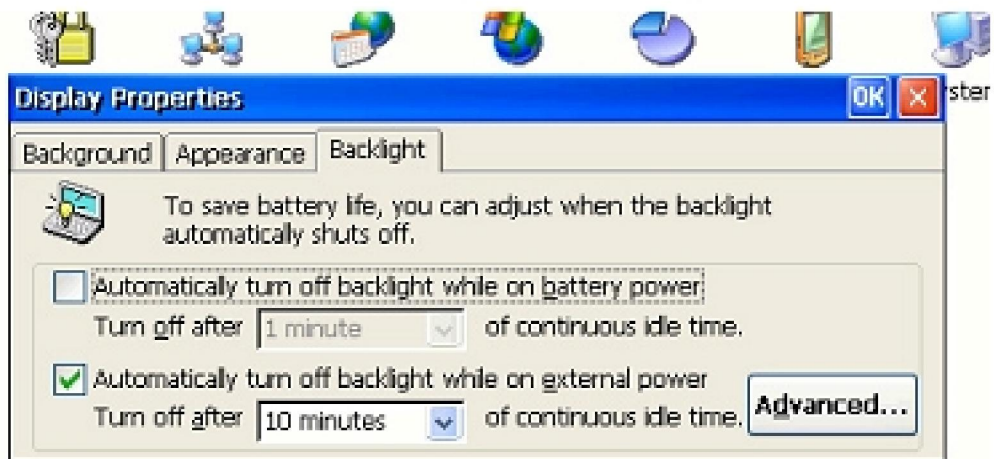
Like on a desktop PC, the system time is shown on the bottom right corner of the screen. Double click this area (or tapping twice) can invoke the dialog box for setting time and date.



#### 4.1.5 Backlight Management

To save the life of the backlight CCFL of the LCD, the system can be configured to automatically shut off the backlight after being idle for a particular period of time. Tap

"Start" ->"Settings" ->"Control Panel" ->"Display" ->"Backlight". Check the box "Automatically turn off backlight while on external power", select the idle time from the dropdown list. The default value is 10 minutes.



#### 4.1.6 File Storage Management

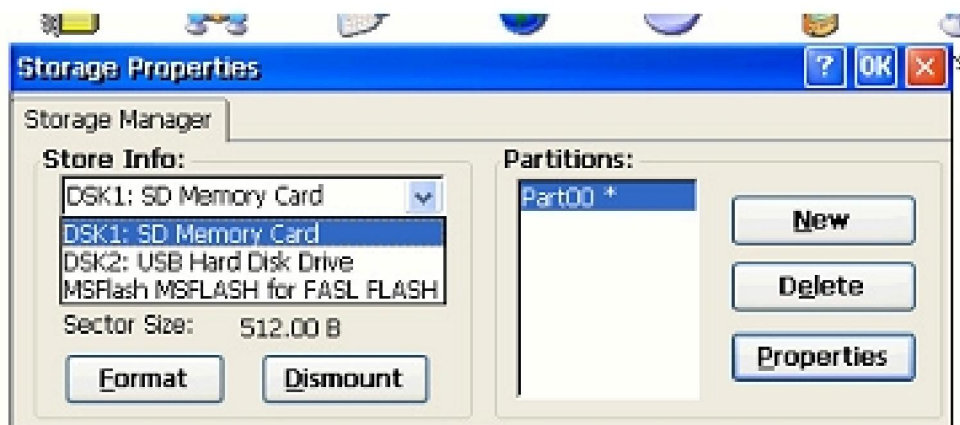
Files can be stored on three different media on MT6000: on - board NOR Flash, SD Card and USB memory devices.

The on - board Flash is the media for system image file storage. The total volume is 32MB, of which the system image will occupy about 26MB. The user can use the remaining 6 - 7MB for storing user file and application data. The root path of the NOR Flash is "\NOR Flash". The fixed NOR Flash is not easy to be replaced and frequent writing operation will shorten its life, therefore, we recommend the user store the application and data on SD card or USB memory devices.

Any SD card be formatted to the FAT file system can be identified by the system when inserted. The card will be labeled as "SD Card" in the system explorer. And the root path of it is "\SD Card". Please use standard SD card with the volume less than 2GB with MT6000.

Any USB storage device be formatted to the FAT file system can be identified by the system when plugged into the USB - A port. The device will be labeled as "Hard Disk" in the system explorer. The root path of the device is "\Hard Disk".

The user can conduct operations such as Dismounting, Formatting and partitioning in the *Storage Manager* program of the *Control Panel*.



Storage Manager

**Note: To maintain any data non - volatile upon power - off, the user MUST use one of the three**

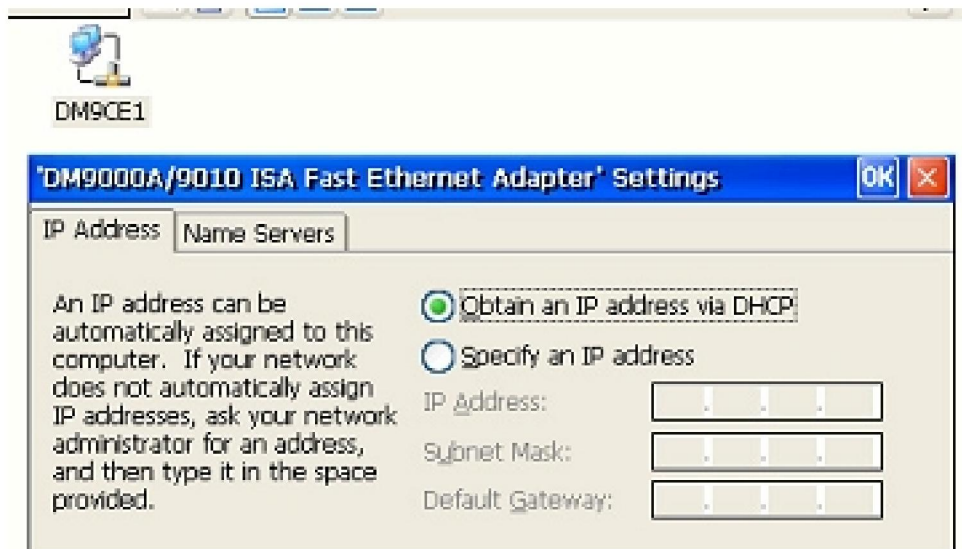
devices: NOR Flash, SD Card or USB memory as the storage media. Data could be stored under the path like "My Documents..", but will be lost upon power - off. Make sure you choose the right path for the critical data and files!

## 4.2 Connectivity and Network

### 4.2.1 Ethernet

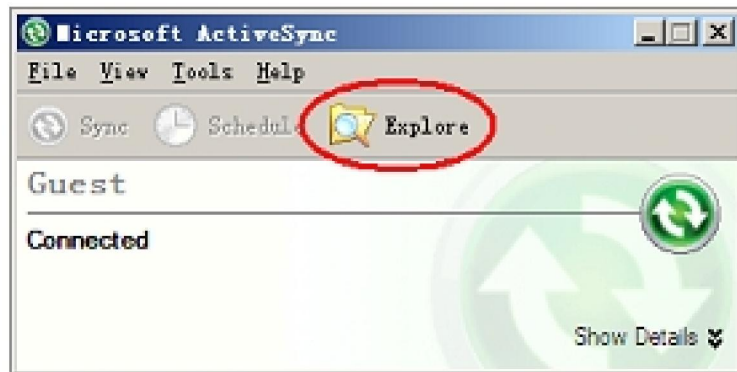
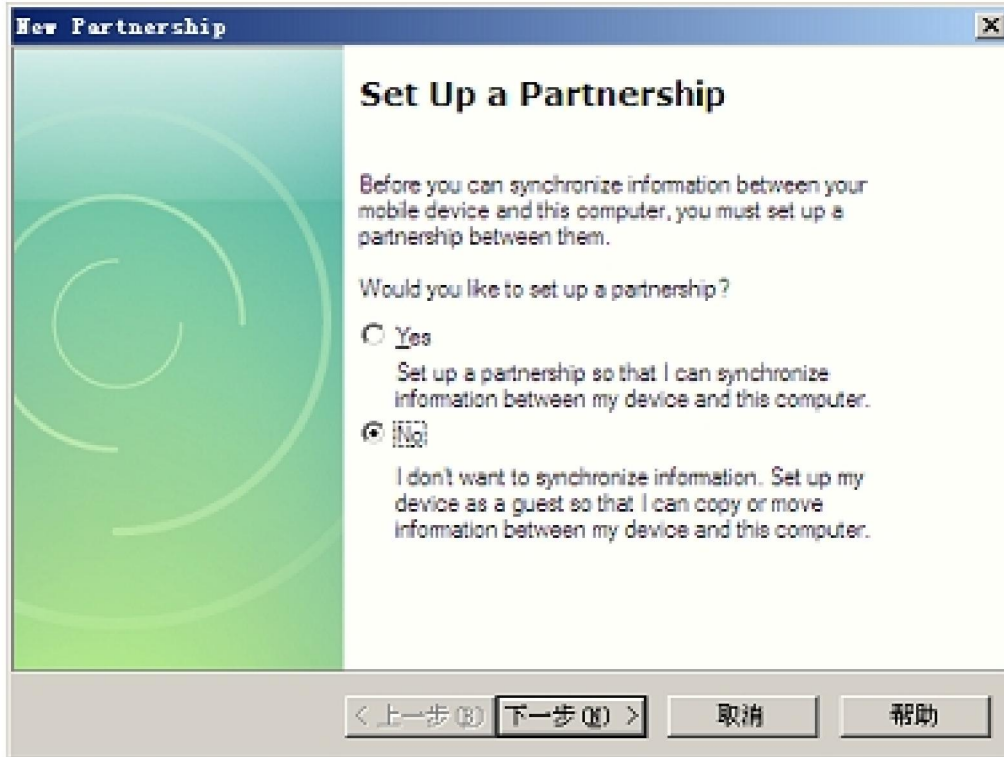
MT6000 could be connected to Ethernet through the RJ45 port on the back. By default, the IP address of the device is automatically obtained via DHCP. To view the network configuration, tap the net icon on the system tray to popup the "IP Information" dialog box.

To manually configure the network, tap "Control Panel" ->"Network and Dial - up Connections" ->"DM9CE1", select the option "Specify an IP address" and enter the required IP address, subnet mask, default gateway and name servers. Tap the button "OK" to finish the setting.



### 4.2.2 ActiveSync

To connect a MT6000 to a desktop PC and exchange data between the two, you can use the free software ActiveSync from Microsoft. We recommend using a USB A - to - B cable to connect the panel with the PC, see appendix for the appearance of the USB cable. To start synchronize, plug the B end into the USB - B port of MT6000 and the A end into the USB port of PC, and then run the ActiveSync software. Normally the PC will automatically detect the panel and prompt a dialog box for Partnership setting. Select "No" and click the button "Next" to set the connected MT6000 as a "guest". Click the "Browse" button to explore the file on the WinCE device, including those stored on the Flash, SD card or the USB memory sticks.



Interface of ActiveSync

### 4.2.3 Communication with PLC

To communicate with field devices like PLC, use the serial port or optional field bus interface. The configuration of the communication parameters should be conducted with respective application software. The user could also develop his proprietary application to communicate with specific devices using the interfaces on MT6000. For technical support regarding to the proprietary programming, please contact our technical support staff.

### 4.3 Running application software

Whether specific software is compatible with a Windows CE device depends on the version of the

OS and the type of the CPU of the device. For MT6000 panel, any software compatible with Windows CE 4.2 or 5.0 version and XScale (ARMV4i) processor is OK. If you have any software compatibility concerns, please contact our technical support team.

## **Chapter5 System maintenance and management**

### **5.1 EVManager**

EVManager is a software tool for system OS image updating, restoring MT6000 to factory status, changing the power - up logo, and some other system maintenance operation. It is provided with the panel and also downloadable from Kinco's website.

#### **5.1.1 Connect MT6000 to a PC for system maintenance**

The EVManager operation could be done through the serial port (COM1) or the Ethernet port of MT6000. We recommend using Ethernet port because it is much faster than serial port. Set the encoder switch on the back of MT6000 to 1 "ON" 2 "OFF" (See section 3.1 for detail of the switch). Plug the Ethernet cable and switch the power on. The display of MT6000 will look like the following:

**KINCO MT6xxxT Software Version 1.04**  
**Copyright KINCO HMitek 2008**

**Mac address: xx xx xx xx xx xx**

**IP address: xxx.xxx.xxx.xxx**

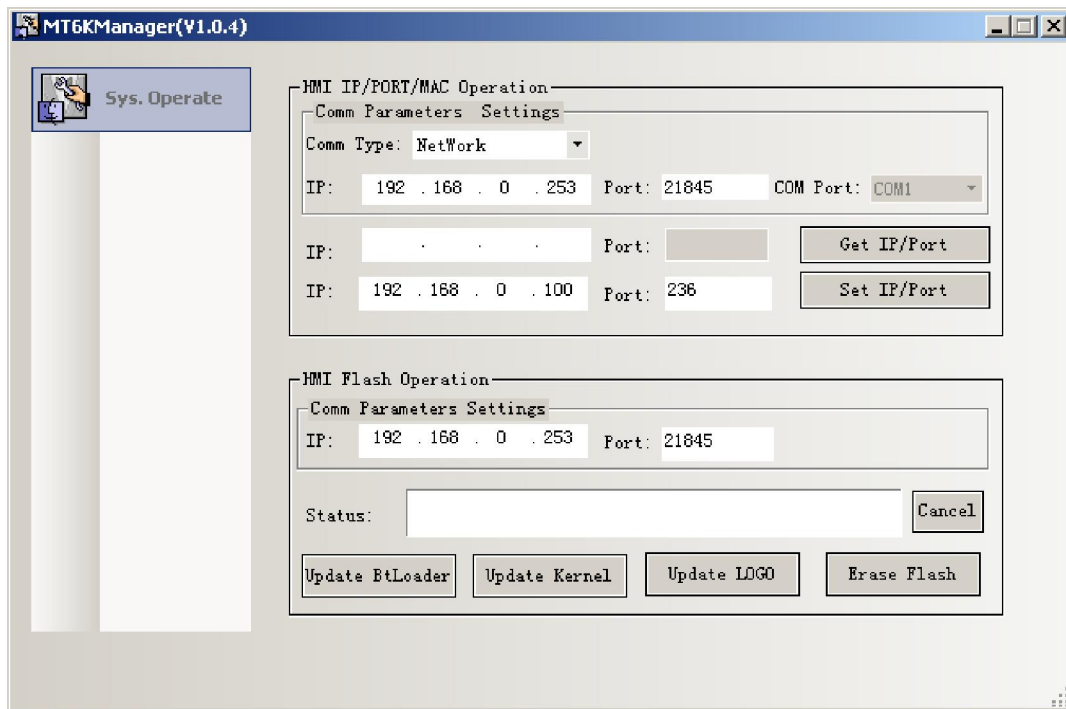
**Download Port: 236**

#### **Download Mode**

Please note that the IP address shown here is not necessarily the same as the IP address configured in the windows CE environment. Please make sure the panel and the PC running EVManager are in the same local network. Open the EVManager software on the PC, a setting dialog like the picture below will appear. Select "Ethernet" in the dropdown list. Copy the IP address on the display of MT6000 to the first line of the IP address input box. By default, the IP address of MT6000 is 192.168.100.55, the port number is 236. Keep the default setting if the PC is within the subnet 192.168.100.xxx. If the PC is not in the subnet, we suggest directly connect the PC to the panel and set the PC to the subnet of 192.168.100.xxx. After finishing the setting and connection, test the connection by clicking "Get IP address" button on the right of the second line of the IP address setting. If the connection is successfully established, the PC will get the IP address of MT6000 and display it in the second line. The IP address will be the same as the panel shows on its display.

When the connection is successfully established, the user can update the bootloader file, the OS

kernel file, and the power - on logo file. The last option is "Erase the entire Flash".



### 5.1.2 Bootloader updating

In most cases there is no need to update Bootloader file. Sometimes user may be asked to conduct such update by Kinco's technical staff. In these cases, Kinco will provide necessary files and technical instruction to help the user. The file name of the Bootloader file of MT6000 is "boot270.bin". Click "Update Bootloader", find this file and click "OK" to start the updating process. There will be progress bar shown on the PC and the panel. Please make sure that the power supply and the communication connection are ok during this process, or the panel may be damaged permanently. Once being successfully updated, EVManager will pop up a dialog box indicating that the updating has been done, MT6000 will display "Writing Flash OK!" also.

### 5.1.3 Kernel updating

Sometimes the user may need to update the OS kernel file to add new function block or restore the panel to factory status. Please select the proper kernel file for updating. The file name of the kernel file is "NK.bin". The updating process is similar to that of bootloader updating. Click "Update Kernel", select the kernel file and confirm, then the updating will start automatically. There will be progress bar on the PC and the panel. Because the kernel file is much larger than the bootloader file, the time needed is longer also. (It may take about 3 minutes). The PC and MT6000 will indicate that the updating had been successfully done after all process finished. Occasionally the PC will indicate "Update failure due to communication timeout" while the MT6000 indicates "Writing Flash OK!". In this case, the updating has been successfully done, please ignore the error prompt.

**Note: Updating the kernel will result PERMANENT LOSS of all system configuration, installed application and files stored on the NOR Flash. Please make sure you have backed up all necessary files before updating. Files stored on the SD card will not be influenced by the updating.**

### 5.1.4 Logo Updating

MT6000 has a useful feature: logo display. During the time span between power - up and entering WinCE OS, MT6000 can show a static image on the LCD. By default, it is the logo of Kinco. The user can change it to his own logo or other picture.

Click "Update LOGO" button, select the proper product model in the dropdown list, then click "Select" to select image you want to show. Supported file formats include jpg, gif and bmp. Please note that the product of the width (number of pixel) and the height (number of pixel) of the image should not be bigger than 131072. And the width and height of the image should not exceed the actual size of the device (the display resolution of the LCD).



The updating process is similar to those of the updating of bootloader and kernel.

### 5.1.5 Flash Erasing

Click the button "Erase Flash" will delete all contents stored on the NOR Flash on board. This will leave a "clean" flash ready for further operation such as bootloader updating or kernel updating.



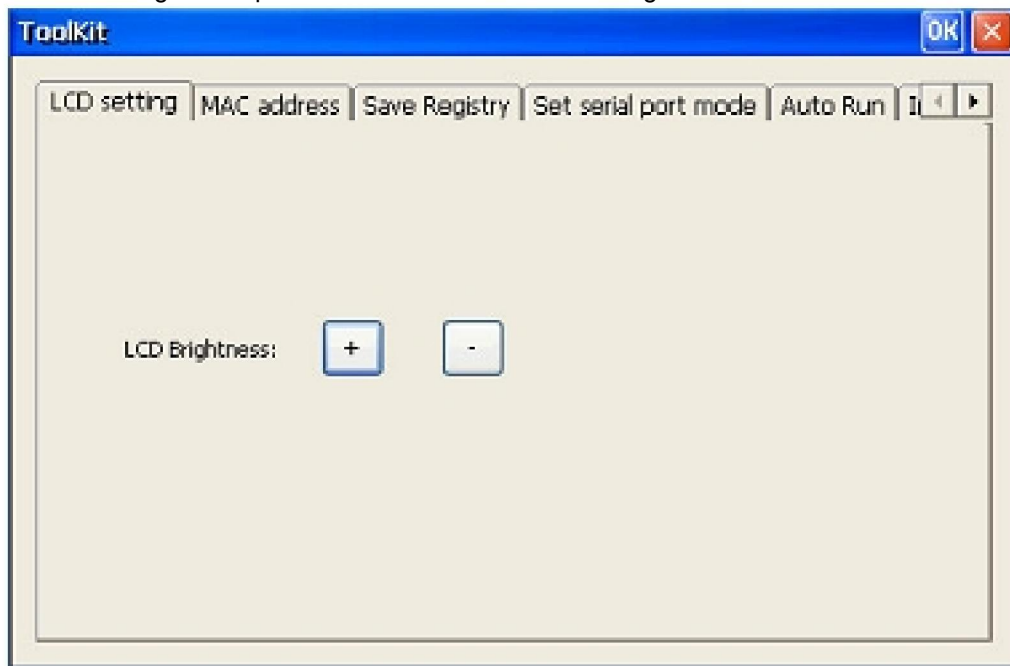
Please be careful when using this function because all contents will be deleted and cannot be restored.

## 5.2 ToolKit

To make the system management more convenient, Kinco provides an application program called Toolkit within the pre - installed Windows CE OS. With toolkit, the user can adjust the brightness of LCD, view the MAC address of the panel, save the registry, view and configure the mode of the serial ports, configure the autorun program and view the version information of the OS. The user interface of toolkit is shown below. To enter it, tap "Start" - >"Program" - >"Toolkit".

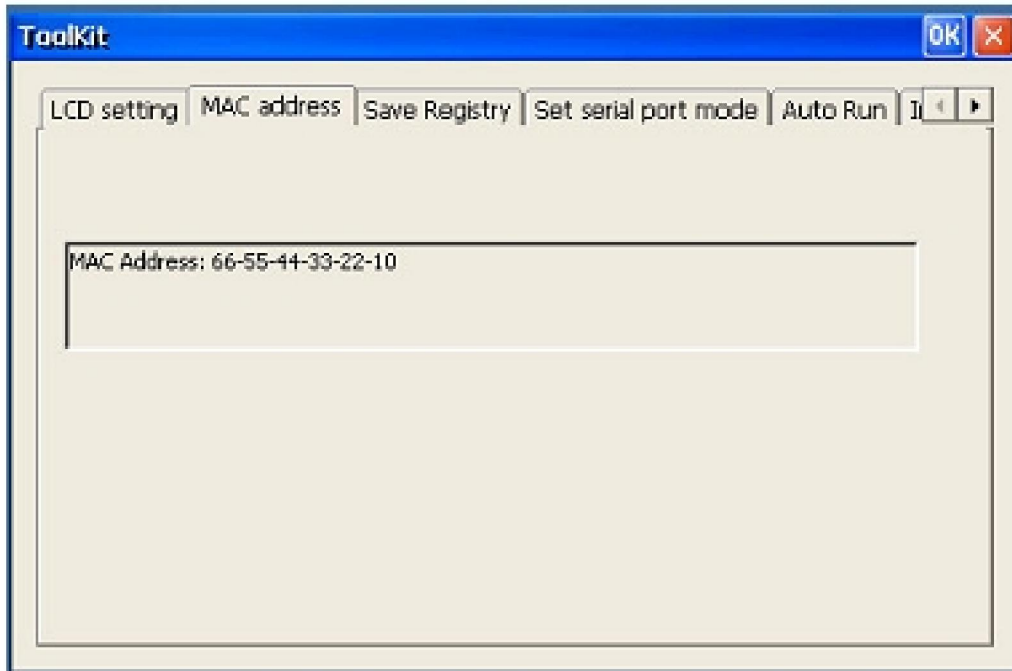
### 5.2.1 Adjust LCD brightness

The brightness of the LCD of MT6000 has an 8 - level range for adjusting. Tap the "+" button to make the LCD brighter. Tap the "-" button to make it less bright.



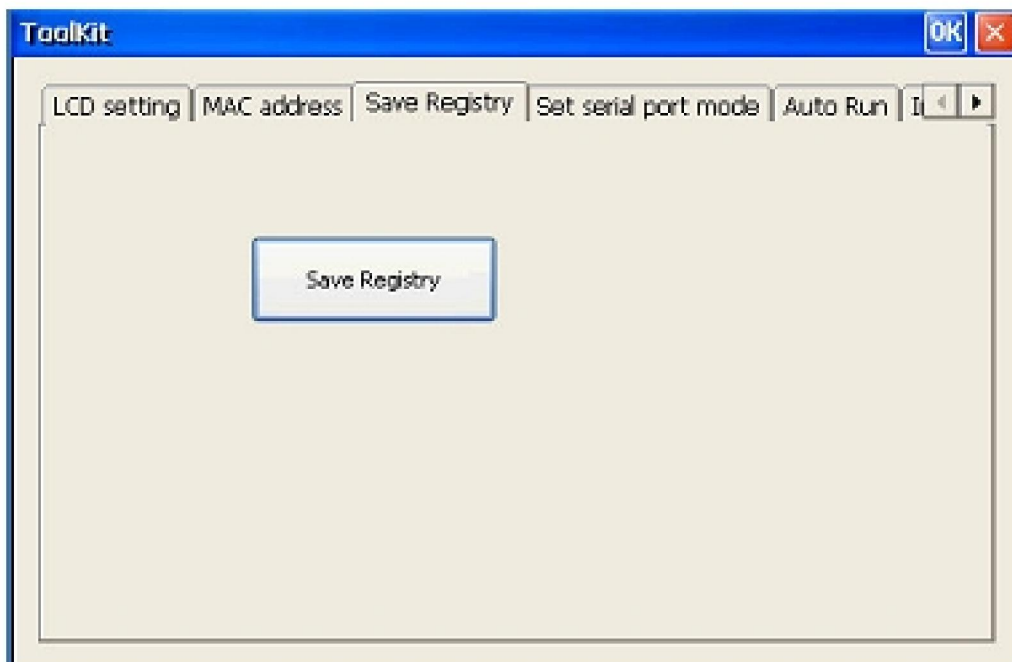
### 5.2.2 View the MAC address

Some application needs the use to enter the MAC address of the device. View the MAC address in the "MAC address" tab.



### 5.2.3 Save Registry

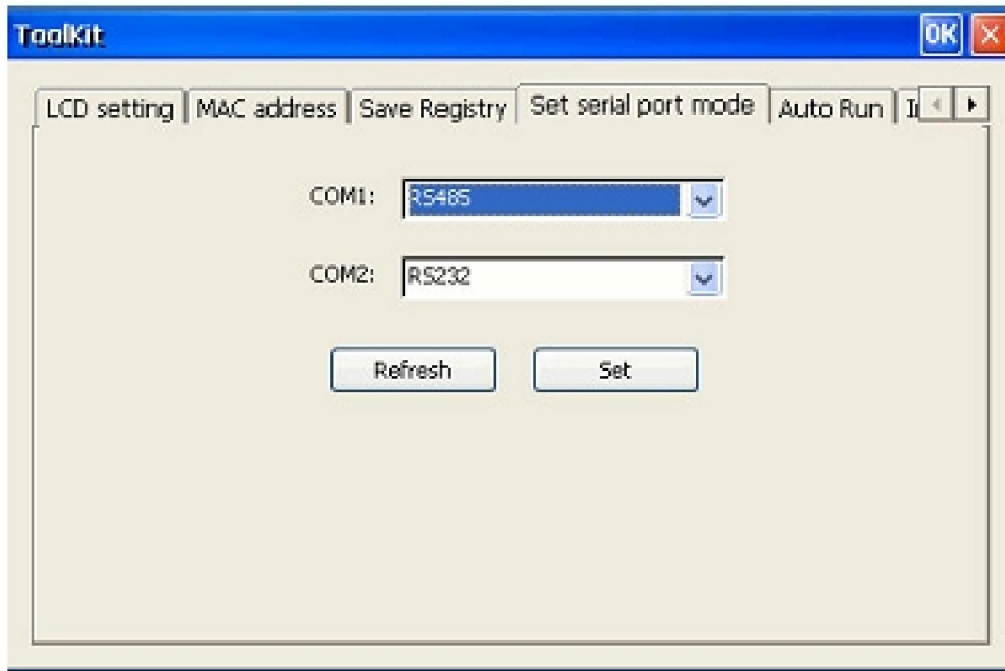
Enter the "Save Registry" tab and tap the "Save Registry" button to save the registry.



### 5.2.4 Configure serial ports mode

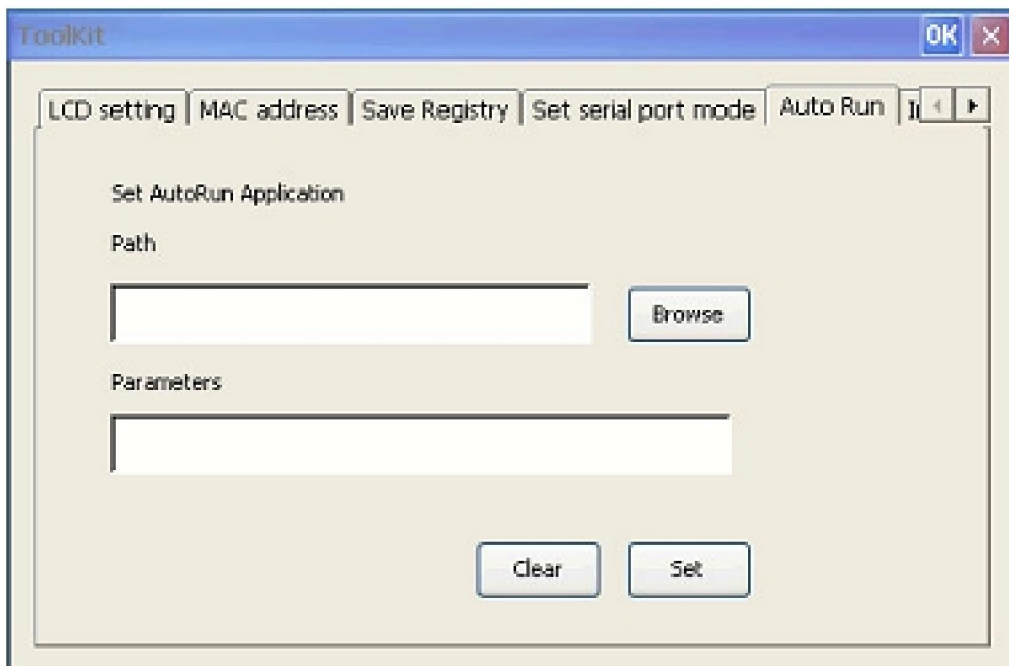
The COM1 and COM2 serial ports can be configured to RS232/RS485/RS422 mode. To set the mode for those ports, enter the "Set serial port mode" tab and select the proper mode in the dropdown list. Tap the button "Set" to save the change. To view the current mode of the two

ports, tap the button "Refresh".



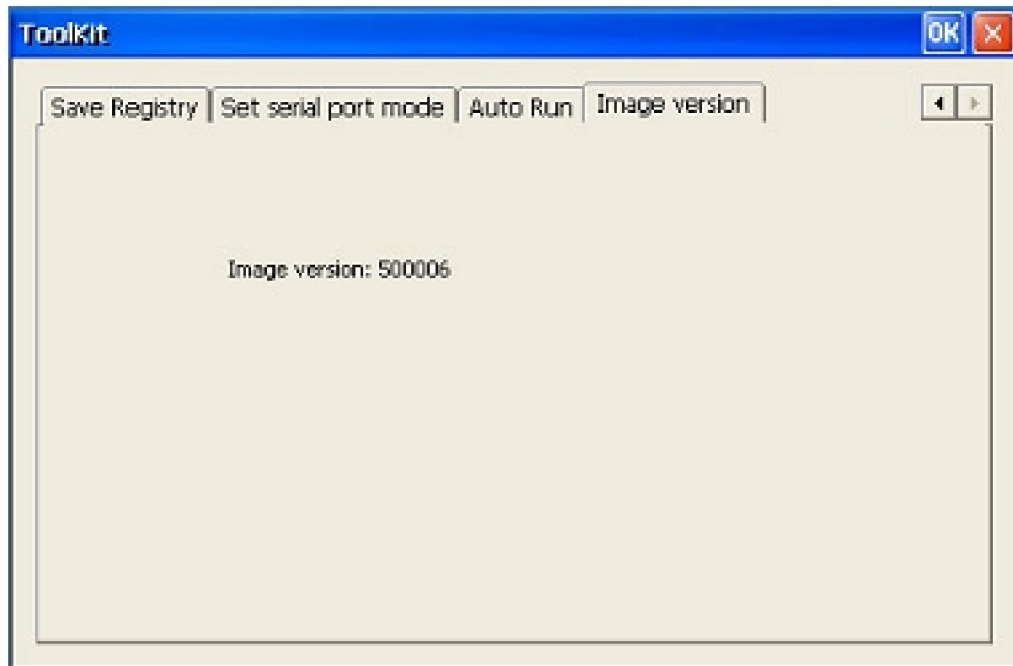
### 5.2.5 Auto Run

The user may want the panel automatically run certain application program after power - on without manual interference of operators. Please select the path of the program you want to run in the "Auto Run" path. Click "Browse" button to find the path or manually input it in the edit box. If there are any execution parameters, specify them in the edit box "Parameters". To clear previous auto run setting, tap the button "Clear". Please tap the "Set" button to save the change before exit the toolkit.



## 5.2.5 View the OS version

Knowing the version information of the current panel is important for system updating and technical support. To view the version of the panel, enter the "Image Version" tab.



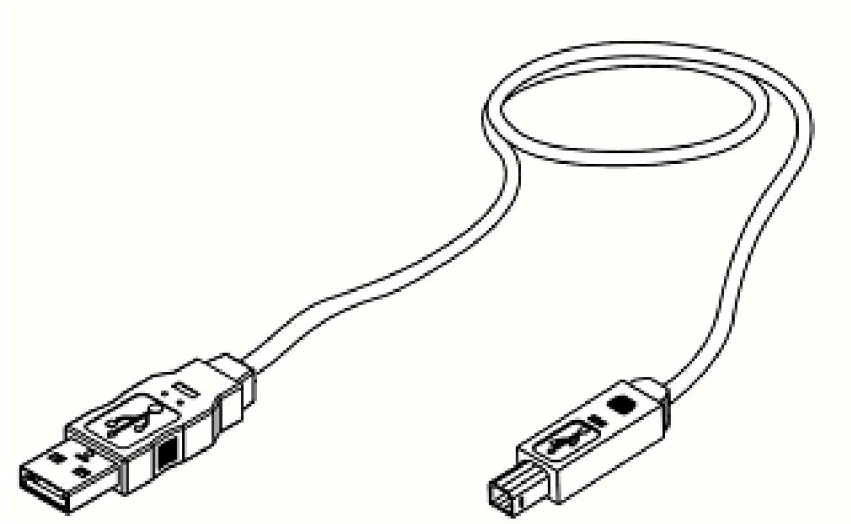
## Appendix A: Cables

### Ethernet Cable

Please use standard Ethernet cable (Cat5 recommended) for Ethernet connection. In the case of direct connection between a PC and a panel, a straight - through cable may be required.

### USB Cable for Synchronize

The picture below shows a USB A - to - B cable for synchronize and data exchange between PC and panel. It is included within the standard product package. We recommend using the original USB cable to avoid potential risk of damaging the panel and/or the PC.



## PC Serial Download/Debug Cable

The cable for connecting MT6000 to a PC is not contained within the standard package, because we recommend using Ethernet connection for system debug and maintenance. However, the user can order the cable from Kinco (order number ?????) or make one by his own. Please refer to the scheme below when making the cable.

