

HMI5000 Series

Installation Guide



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Introduction

Thank you for purchasing a Maple Systems HMI5000 Series graphic operator interface terminal (OIT). The HMI5000 Series touchscreens are configured using the EZware-5000 software (purchased separately) and include the following models: HMI5043N/T, HMI5056N, HMI5070NH/TH/ETH, HMI5100N/T, HMI5104TH, HMI5104XH, HMI5121X, and HMI5150X. This booklet describes the steps necessary for installing the HMI5000 Series touchscreens.

For information on programming and configuring the HMI, please refer to the **HMI5000 Series Programming Manual** available on the EZware software CD. For additional information, please refer to the Support Center section on our website, www.maplesystems.com. The Support Center provides links to manuals, FAQs, technical notes, training videos, sample projects, controller information sheets, and controller cables.

Static Awareness

Do NOT remove the rear cover of your HMI5000 Series product – doing so will void your warranty. When the rear cover is removed the circuitry inside is exposed to possible damage by electrostatic discharge during handling. Minimize the possibility of electrostatic discharge by:

- Discharging personal static by grounding yourself prior to handling the HMI.
- Handling the HMI at a static-free grounded workstation.
- Connecting the frame ground ($\frac{1}{4}$) connector of the HMI to a clean earth ground.
- Placing the HMI in an antistatic bag during transport.

Unpacking the Unit

Carefully unpack the HMI. Please read any instructions or cautions that appear on the shipping container. Check all material in the container against the packing list. Maple Systems, Inc. will not accept responsibility for shortages against the packing list unless notified within 30 days. The equipment and accessories were inspected and tested by Maple Systems before shipment; all of the equipment should be in good working order. Examine the equipment carefully; if any shipping damage is evident, notify the carrier immediately. You are responsible for claim negotiations with the carrier. Save the shipping container and packing material in case the equipment needs to be stored, returned to Maple Systems, or transported for any reason.

Packing List
HMI5000 Series Touchscreen
Power Connector
Mounting Clamps HMI5043N/T, HMI5056N, HMI5070NH/TH/ETH HMI5100N/T, HMI5104TH, HMI5104XH HMI5121X, HMI5150X
Spare Fuse
HMI5000 Series Installation Guide

Warranty

Maple Systems warrants each product to be free from electrical and mechanical defects in materials and workmanship for a period of two years from the date of shipment. This warranty does not apply to defects in the Products caused by abuse, misuse, accident, casualty, alteration, negligence, repair not authorized by Maple Systems, use on current or voltages other than specified by Maple Systems, or application or installation not in accordance with published instruction manuals. This warranty is in lieu of any other warranty either expressed or implied.

Maple Systems liability is limited to the repair or replacement of the Product only, and not costs of installation, removal, or damage to user's property or other liabilities. If Maple Systems is unable to repair or replace a nonconforming Product, it may offer a refund of the amount paid to Maple Systems for such Product in full satisfaction of its warranty obligation. Maximum liability of Maple Systems is the cost of the Product.

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Installation of HMIs

CE Compliance

The HMI5000 Series Graphic HMIs have been tested to conform to European CE requirements, which meet or exceed the noise emissions and immunity requirements as set forth in the EN55022 (Emissions) and EN55024 (Immunity) standards. The products are designed to withstand electrical noise in harsh industrial environments. They also conform to

requirements that limit electrical emissions. However, this does not guarantee that the products will be totally immune from possible malfunction in cases where severe electrical noise occurs. Therefore, we strongly recommend that you follow the guidelines outlined in this guide for proper wire routing and grounding to insure the proper operation of your graphic HMI.

NEMA Rating

The HMI5000 Series is rated for NEMA 4/12 (indoor) or IP65 installations. This means that when the HMI is properly mounted to a NEMA 4 panel or other NEMA 4 rated enclosure, the front enclosure of the HMI will provide protection to the inside of the panel from splashing water, wind-blown dust, rain, or hose-directed water. The HMI must be installed according to the instructions in this manual to be properly sealed.

Environmental Considerations

The HMI5000 Series is designed to operate in temperatures from 0° to 50°C (32° to 122°F). *NOTE: The HM15070ETH has an operating temperature range of -20° to 55°C (-4° to 131°F)* It is intended for indoor installations and may not be suitable for use in certain outdoor applications. Avoid installing the HMI5000 Series touchscreens in environments with severe mechanical vibration or shocks. Do not install the HMI in enclosures with rapid temperature variations or high humidity. Either will cause condensation of water inside the device and eventual damage to the HMI.

Safety Precautions

Please observe the following precautions when installing the HMI. Failure to comply with these restrictions could result in loss of life, serious personal injury, or equipment damage.

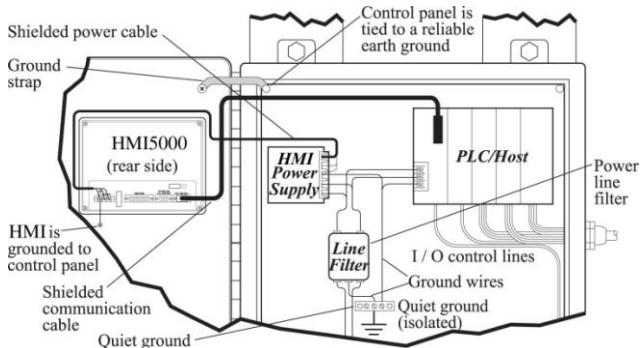
-  **Warning:** *Do not operate the HMI in areas subject to explosion due to flammable gases, vapors, or dusts.*

- ⚠ **Warning:** Do not connect the HMI to an AC power source. You will cause permanent damage to the HMI.
- ⚠ **Warning:** Do not attempt to use a DC power supply that does not meet HMI power requirements. You may cause malfunction or permanent damage to the HMI.
- ⚠ **Warning:** Do not power the HMI with a DC power supply used for inductive loads or for input circuitry to the programmable logic controller. Severe voltage spikes caused by these devices may damage the HMI.

Control Panel Design Guidelines

Pay careful attention to the placement of system components and associated cable routing. These items can significantly enhance the performance and integrity of your control application.

Figure 1: Typical Panel Layout



Control Panel Grounding

The control panel must be connected to a good, high-integrity earth ground both for safety considerations and shielding purposes. Maple Systems cannot overemphasize the importance of good grounding. If you fail to use good grounding procedures during installation, sporadic malfunction of the HMI may occur:

Connect the HMIs chassis ground terminal to a reliable earth ground with a low-resistance path.

Route all earth ground wires that lead from the HMI, the PLC, the power supply, and the line filter to a central earth ground point such as a barrier strip. This will ensure that no ground current from one device influences the operation of the other devices.

Connect the HMI chassis ground terminal to the control panel door using a heavy-gauge short braided cable or ground wire to minimize resistance.

Connect the power cable's shield wire to the HMI's chassis ground terminal.

Connect the control panel to earth ground using a copper grounding rod close to the HMI and control panel.

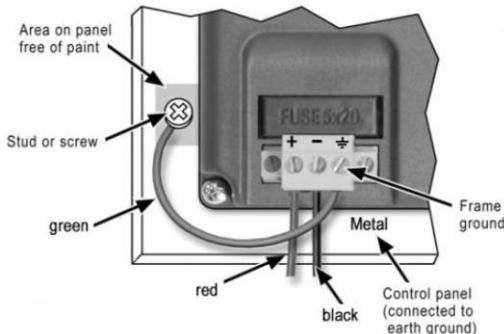
Hinged doors on control panels do not provide a long-term electrical connection to the rest of the enclosure. Corrosion develops over time and prevents good electrical contact. For this reason, a separate wire braid should be installed from the hinged control panel to the rest of the enclosure.

For a more in-depth overview of ground wiring techniques, refer to Technical Note #1027, "OIT Ground Wiring and Electrical Noise Reduction," which you can find in the Tech Notes section on our web site.

Connect HMI Chassis Ground to Control Panel

To reduce the possibility of electrical interference, connect the chassis ground terminal of the HMI to a clean earth ground. If the control panel is metal, make sure it is properly grounded. Then connect a short heavy-gauge wire (#14 AWG) from the chassis ground terminal of the HMI to a mounting bolt on the control panel door. The mounting bolt must have good electrical contact to the control panel; scrape away any paint that may be covering the panel to provide a good connection.

NOTE: If the control panel is made of a non-conductive material, it is essential that you connect the chassis ground terminal of the HMI to a clean earth ground point located close to the panel.

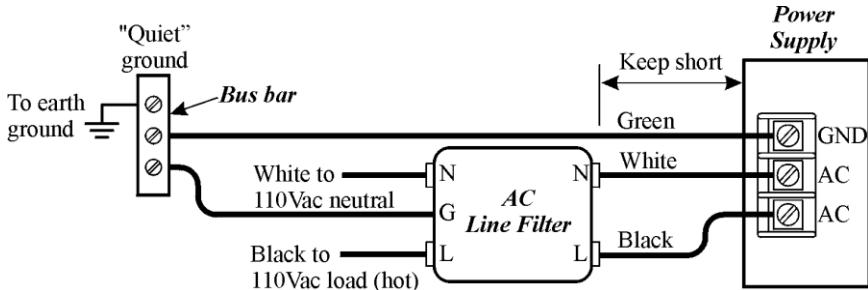
Figure 2: Chassis Ground Connection (HMI5043N shown)

Power Supply Selection

The power supply used to power the HMI should provide an output of $+24 \text{ VDC} \pm 20\%$ measured at the HMI power terminal block. A 24VDC regulated power supply *dedicated to the HMI* is recommended. Use a power supply with adequate current rating based upon your particular model (visit the Support Center Specifications page on our website).

A power line filter installed at the AC input to the HMI power supply is highly recommended as a safeguard against conducted RF noise, which is often present on factory power lines. The wires connecting the output of the power line filter to the power supply should be kept as short as possible to minimize any additional noise pickup. The case of the power line filter should be connected to a quiet earth ground. The power line filter should have a current rating of at least 3 Amps with common mode and differential mode attenuation. In applications that may have high frequency noise present, we also recommend using a resistor ($\sim 1 \text{ M}\Omega$) and capacitor ($\sim 4700 \text{ pF}$) in parallel to clean earth ground on the DC output of the power supply.

Do not use the power supply used to provide power to the HMI to power switching relays, solenoids, or other active devices.

Figure 3: Power Line Filter Connection

Cable Routing and Noise Immunity

Follow these guidelines when routing cables to the HMI:

- Always route the HMI communication cable and the power cable away from any AC voltage or rapidly switching DC control lines.
- Never bundle the HMI cables together with 120VAC power wires or with relay wiring.
- Try to keep at least 8 inches (20 cm) of separation between the HMI cables and other power wiring. If voltages greater than 120VAC are used in the system, greater separation is required.
- If the HMI cables must come near AC wiring, make sure they cross at 90 degrees.
- Run AC power wires in a separate grounded conduit to reduce electrical noise interference.
- Keep the cable lengths for the HMI as short as possible. Do not coil excess cable and place it next to AC powered equipment.
- Cover any equipment used in the enclosure that operates at high frequency or high current levels with a grounded metal shield.

Installation

It is necessary to follow all installation procedures described in this chapter for electrical noise immunity and CE compliance.

Your Maple Systems HMI is designed to connect easily to your PLC. External rear connectors provide quick connections for power, communications and programming wiring.

Connect the HMI to Power

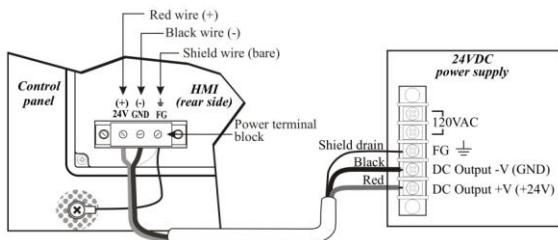
Use the separate 3-position terminal block supplied with the HMI to provide power to the HMI.

The power cable for the HMI should be 18AWG, 2-conductor wire with a shield drain wire and protective shield (foil/braid). You may buy cable P/N 6030-0009 by the foot from Maple Systems to make your own power cable.

Always run the DC ground wire directly back to the signal return of the power supply. *Do not use the chassis ground wire as your signal return.*

⚠ Caution: To prevent possible damage to the HMI, we recommend waiting ten seconds after removing power to the HMI before applying power again.

Figure 4: HMI Power Wiring



► To connect the HMI to power:

1. Connect the power cable to the HMI.
 - a. Strip the power cable shield to expose 2" of the black and red wires.

- b. Strip about $\frac{1}{4}$ " of insulation from the black and red wires.
 - c. Connect the red wire to the 24V DC positive (+) input of the HMI power terminal block.
 - d. Connect the black wire to the 24V DC negative (-) input of the HMI power terminal block.
 - e. Connect the power cable shield wire to the HMI power terminal block's chassis ground input.
2. Route the power cable to the HMI power supply. The power cable should not be any longer than necessary.
 3. Install the power supply wires as follows (with colors shown for Maple Systems cable P/N 6030-0009):

Color	Power Supply	HMI
Red	+Output/+24V DC	+24 V
Black	-Output/+24V DC return	GND
Shield	Case ground	FG or \equiv

NOTE: The power connector on the HMI5000 Series uses a 3-position terminal block with screw-down clamps. Lugs are not required.

Panel Preparation

A metal panel or mounting surface with a minimum thickness of 15 gauge (0.059 in/3.3 mm) if cold-rolled steel or hardened steel, or 10 gauge (0.101 in/2.6 mm) if aluminum alloy (6061-T6 preferred) is required. Thinner panels or surfaces may bow between the mounting clamps and not form a seal with the gasket. Make sure all supplied mounting clamps are used and that the panel does not flex or bow more than 0.010 in. to ensure a proper seal.

The HMI should be mounted into a panel with a depth of at least 4 in. (105 mm). Allow a clearance of at least 1 in. (25 mm) on each side for

mounting hardware. Consider proper clearance for cable connections when mounting.

NOTE: Cutout dimensions for each particular HMI model are readily available for download from the Support Center-Dimensional Drawings section of the Maple Systems website.

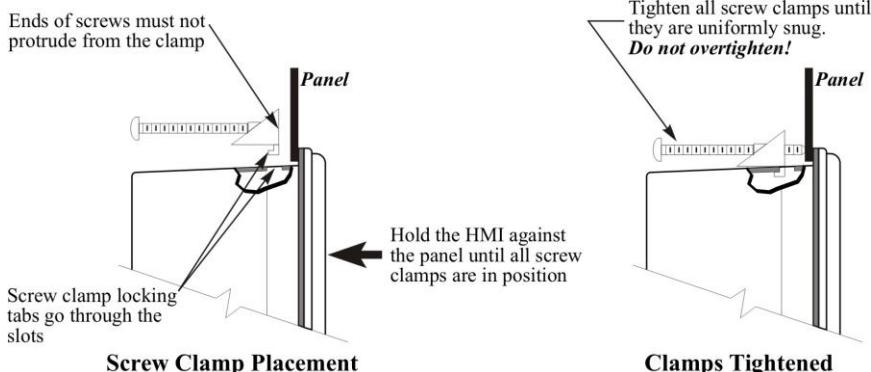
The area of the panel or mounting surface where the gasket comes into contact must be flat and free of scratches, pits, and other features that prevent the gasket from sealing properly. If the panel or mounting surface is not uniform, thick, flat, stiff, or smooth enough, then a sealant such as silicone may be required.

NOTE: Clean and deburr the panel cutout before the HMI is installed.

⚠ Warning: The HMI requires a stiff, flat, smooth mounting surface free of blemishes to seal properly to NEMA 4.

Mount the HMI to the Panel

Figure 5: Installing Screw Clamps to the HMI



Note: The clamps for your model may be slightly different than shown here, but essentially work in the same way.

STEPS:

1. Prepare the clamps for the HMI by inserting the screws into the clamp as shown above. Position the screws so that the ends don't protrude through the clamp's hole.
2. Set the HMI in the panel cutout and hold it in place until all clamps are in position.
3. Tighten the screw clamps in an even pattern until all are uniformly snug.

⚠ Caution: Do not over-tighten the screws beyond snugness or you may damage the housing or warp the overlay.

Mounting Clamp Placement

Model	Left Side	Right Side	Top	Bottom	Clamps Provided with Unit
HMI5043N/T	2	2	0	0	4
HMI5056N	1	1	2	2	4
HMI5070NH/TH	2	2	2	0	4
HMI5100N/T, HMI5104TH, HMI5104XH	0	0	3	2	5
HMI5121X	2	2	3	3	9
HMI5150X	2	2	3	3	10
HMI5070ETH	1	1	2	2	6

REINSTALLATION: If, at anytime, you are required to reinstall an HMI into a panel, be aware that the gasket will take a 'set' to the panel and may no longer provide an adequate NEMA 4 seal. Therefore, for best results, we recommend that you replace the gasket if reinstallation is required.

Configuration Wiring

To configure the HMI using the EZware-5000 software, you will need the correct configuration cable for your HMI. Please refer to the following table for configuration (download) cable requirements.

HMI Model	Ethernet Configuration Cable P/N 7431-0104	USB Configuration Cable P/N 7431-0115
HMI5043N, HMI5056N, HMI5070NH, HMI5100N		X
HMI5070TH/ETH, HMI5100T, HMI5104TH	X	X
HMI5043T, HMI5104XH, HMI5121X, HMI5150X	X	

Ethernet

If using a switch or router between the PC and the HMI, use a straight-through or crossover cable as required by the switch or router.

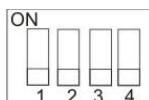
USB

A USB driver (included with the EZware-5000 software) must be installed when downloading from the PC to the HMI via a USB connection. To install the USB driver, please refer to the help file ‘How Do I’ section in EZware-5000 for detailed step-by-step instructions.

Note: When connecting two powered devices, a difference in potential can exist between the ground reference on each device. If there is a difference in ground potential (voltage), making a connection via a USB cable can complete a ground loop that may damage the HMI and PC. *We recommend using the Maple Systems USB Configuration Cable (P/N 7431-0115) to connect the HMI to the PC. The shield is not connected between the two ends of the cable, which will prevent a potentially damaging ground loop from occurring between the devices. Please refer to page 5 for proper wiring instructions.*

Maintenance

Figure 6: DIP switch positions (power must be cycled on the HMI to enable the DIP switch mode except DIP switch 4).



SW1	SW2	SW3	SW4	Mode
ON	OFF	OFF	OFF	Calibration mode (except X-models)
OFF	ON	OFF	OFF	Hide System Toolbar
OFF	OFF	ON	OFF	Force into Boot Loader mode
OFF	OFF	OFF	ON	Power Button Enable (X-models only)
OFF	OFF	OFF	OFF	Normal operation

Touchscreen Calibration mode: This mode allows you to recalibrate the touchscreen. **Note:** Calibration mode is accessed through the HMI's System Toolbar on the X-models.

Hide System Toolbar: Hides the arrow in the bottom-right corner of the screen that accesses the System Toolbar (same as "Hide System Toolbar" in System Parameters and LB9020).

Boot Loader mode: This mode forces the HMI to not execute the project. This mode is used when replacing or reinstalling the operating system. Contact Maple Systems for more information.

Power Button Enable (X-models only): Enable (ON) or disable (Off) the front panel Power button.

Fusing Requirements

If the display does not come on within two seconds of power up, remove power. An internal fuse will prevent damage if the polarity of the DC power is incorrect. Check wiring to insure proper connections and try to power up again.

Serial Port Connections

The diagrams below indicate the proper pin connections for the serial ports of the HMIs (see Figure 8 for the HMI5043N/T).

Note: *HMI5056N supports COM1 RS-232 and RS-485 2W/4W connections only.*

Figure 7: Serial Port Pin outs

Port A



COM1 [RS-485 2 wire]
COM1 [RS-485 4 wire]
COM3 [RS-232]
COM3 [RS-485 2 wire]

DE9S

Pin#	COM1 [RS-485 2 wire]	COM1 [RS-485 4 wire]	COM3 [RS-232]	COM3 [RS-485 2 wire]
1	TX/RX-	RX-		
2	TX/RX+	RX+		
3		TX-		
4		TX+		
5		Signal Ground		
6				TX/RX-
7			TXD	
8			RXD	
9				TX/RX+



Port B



COM1 [RS-232]
COM2 [RS-232]

DE9P

Pin#	COM1 [RS-232]	COM2 [RS-232]
1		
2	RXD	
3	TXD	
4		TXD
5	Signal Ground	
6		RXD
7	RTS	
8	CTS	
9		

This diagram illustrates the proper pin connections for the HMI5043N/T serial port:

Figure 8: HMI5043N/T Serial Port Pin outs



DE9P

Pin#	COM1 (RS-485 2 wire)	COM1 (RS-485 4 wire)	COM1 (RS-232)	COM3 (RS-485 2 wire)
1	TX/RX-	RX-		
2	TX/RX+	RX+		
3		TX-		
4		TX+		
5	Signal Ground			
6			TXD	
7				TX/RX-
8				TX/RX+
9			RXD	



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