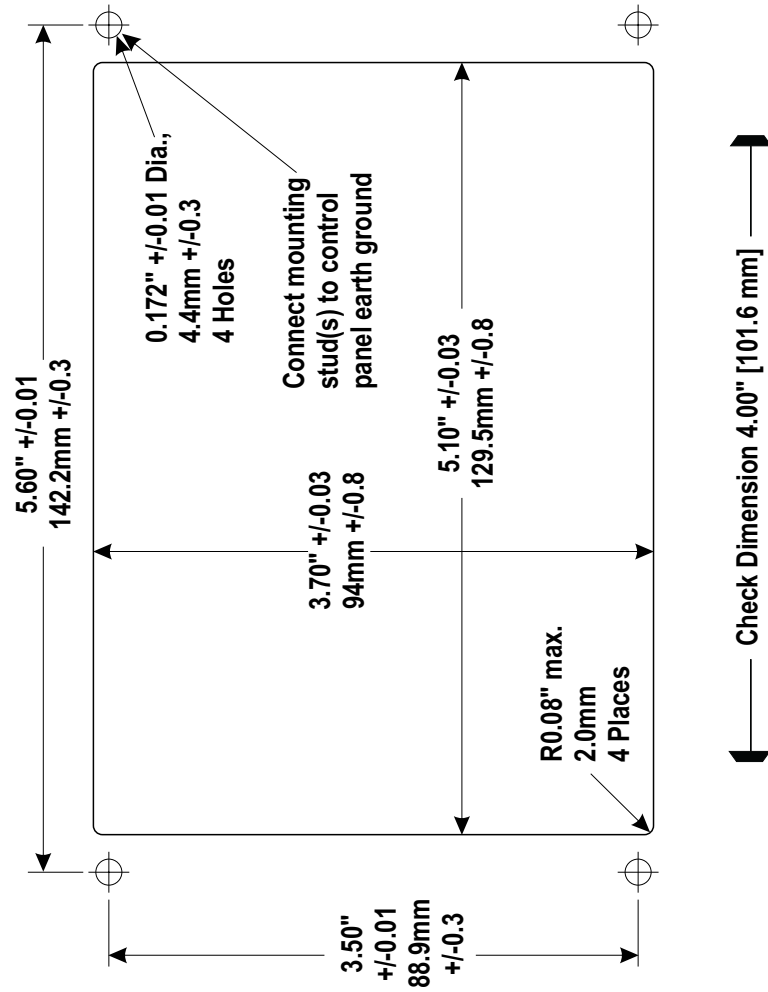
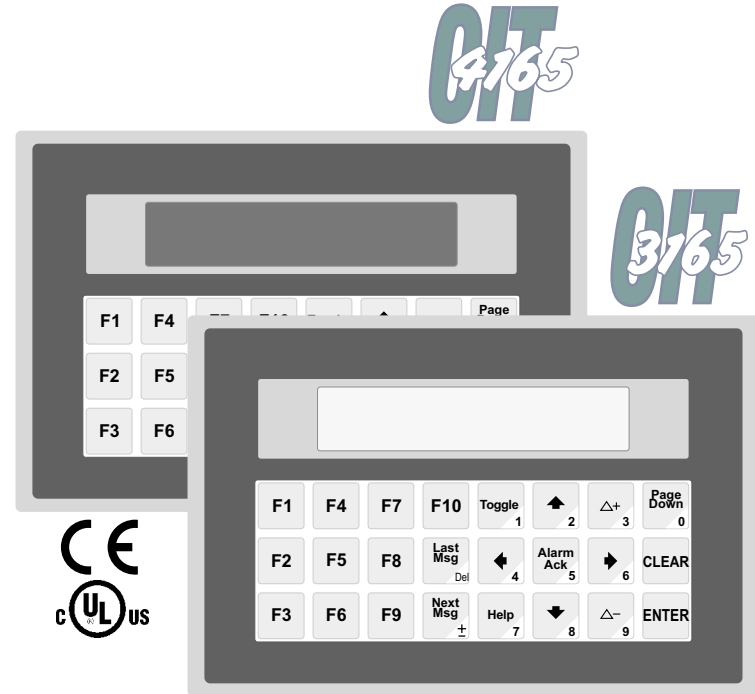


### Appendix D OIT Panel Cutout Dimensions – Front View



# INSTALLATION MANUAL



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Package the unit in its original packaging container or, if unavailable, any suitable rigid container. If a substitute container is used, surround the unit with shock absorbing material; damage in shipment is not covered by the warranty. Include a letter with the unit describing the difficulty and designating a contact person. Send to the following address: Maple Systems, Inc., 808 134th Street SW, Suite120, Everett, WA 98204.

Only Products that have been issued a Return Material Authorization (RMA) number from Maple Systems may be returned. All RMAs must be accompanied with a written purchase order for tracking purposes or, in the case of out-of-warranty repairs, for repair charges on a time and material basis.

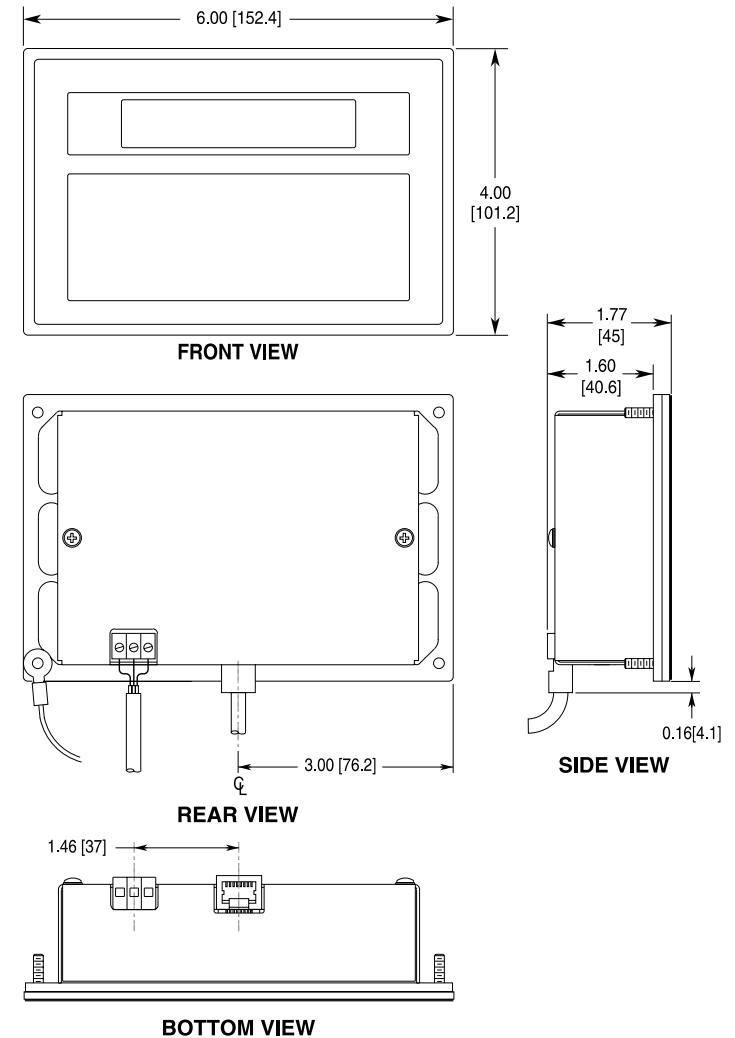
All returns will be tested to verify customer claims of noncompliance with the product warranty. Improper return packaging which makes verification impossible will void the warranty. Products passing the tests will be returned "AS IS" to the customer.

If noncompliance is verified and is not due to customer abuse or the other exceptions described with product warranty, Maple Systems will, at its option, repair or replace the Product returned to it, freight prepaid, which fail to comply with the foregoing warranty, provided Maple Systems is notified of such noncompliance within the one-year warranty period.

## APPLICATIONS ASSISTANCE

This manual is designed to provide the necessary information for trouble-free installation and operation of your new Operator Interface Terminal (OIT). However, if you need assistance, please call Maple Systems at 425-745-3229 or visit our web site at [www.maple-systems.com](http://www.maple-systems.com).

## Appendix C Dimensional Outline



## Appendix B Agency Ratings



UL Class 1, Division 2 Groups A,B,C,D hazardous locations.  
Environmental Type 4, 4x (indoor), 12

### CE European Union Directive Compliance

If this product is installed within the European Union or EFTA regions, the following regulations apply:

This apparatus is tested to meet Council Directive 89/336 Electromagnetic Compatibility (EMC) Standards:

- EN50081-2            Class A (Industrial) Emissions
- EN50082-2            Class A (Industrial) Immunity

According to these Standard, the factor which determines, for EMC purposes, whether an apparatus is deemed to be “industrial” or “Residential, commercial and light industrial”, is given in Clause 1 of EN50081-2 as follows:

Apparatus covered by this standard is not intended for connection to a public mains network but is intended to be connected to a power network supplied from a high- or medium-voltage transformer dedicated for the supply of an installation feeding the manufacturing or similar plant.

The product described in this document is intended for use solely in an industrial environment as defined above. When installed in Europe, any other application is in contravention of European Union Directives, and a breach of those laws.

### Read Me First!

Your new Maple Systems OIT comes from the factory without any communications protocol or operational software installed; therefore

- The OIT will NOT operate until it has been configured using OITware-200 or STEPware-100.
- When power is first applied, the OIT’s display will indicate that it needs to be configured.
- Use the OITware-200 or STEPware-100 software to create a file (or “project”) that can be downloaded to the OIT.
- When the project is transferred, both communications protocol and operational software are automatically loaded and the unit is ready for operation.

To ensure that the OIT meets UL and CE compliance, it is necessary to follow all installation procedures described in this manual.

## Introduction

Thank you for purchasing a Maple Systems OIT3165 or OIT4165. You have selected a rugged, reliable, and powerful operator interface for your application. This booklet describes the steps necessary to ensure trouble-free OIT system operation. **Please read this booklet carefully!!**

## Static Awareness



CAUTION

It is best NOT to remove the rear cover on the OIT. 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 OIT.
- Handling the OIT at static-free, grounded work station.
- Connecting the chassis of the OIT to a clean ground.
- Placing the OIT into an anti-static bag during transport.

## Unpacking the Unit

Carefully unpack the OIT. Please read any instructions or cautions that appear on the shipping container. Check all material in the container against the enclosed packing list. Maple Systems, Inc., will not accept responsibility for shortages against the packing list unless notified within 30 days. The equipment and its 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.

## Appendix A OIT Hardware Specifications

### Mechanical

Material: Aluminum sealed to NEMA 4/12 when panel mounted

Mounting: Panel

Wiring: Unit is field-wired by user to external power plug and shielded RJ-45 communications connectors

Weight: 1 pound (0.45 kg)

### OIT3165A Environmental

Operating Temp: +14 to +149°F (-10 to +65°C)

Storage Temp: -22 to +176°F (-30 to +80°C)

### OIT4165A Environmental

Operating Temp: +14 to +149°F (-10 to +65°C)

Storage Temp: -40 to +185°F (-40 to +85°C)

### Electric Noise Immunity

Emissions: EN55011 (Group 1, Class B)—Generic commercial, light, and heavy industrial environments  
EN50081-1—Generic domestic and light industrial environments  
EN50081-2—Generic heavy industrial environment

Immunity: EN50082-1—Generic domestic and light industrial environments  
EN50082-2—Generic heavy industrial environment

### Power Requirements

Input Voltage: +12 to +30 VDC, Class 2

Power Usage: 2.5 watts typical, 3 watts maximum

### Display

OIT3165 Display Type: Backlit Liquid Crystal Display (LCD)—5 x 7 dot matrix with cursor

OIT4165 Display Type: Vacuum Fluorescent Display (VFD)—5 x 7 dot matrix with cursor

Display Character Size: 2 lines of 20 characters, 0.19 inches (4.8 mm) high

Display Viewing Angle: Approximately 90 degrees

### Keypad

Key Type: Membrane switch with custom legending (all keys)

Feedback: Audible

Layout: 24 user-definable keys arranged in 3 rows

Operational Life: Three million operations

### Communications

Serial Port: RS-232, RS-422, or RS-485

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, or 19.2k

### Internal Features

Memory: 128K x 8 Flash PROM for firmware protocol and configuration data—no battery required

## 5.4. Installing a Slide-In Legend

To replace the factory installed legend with your own:

1. Ensure all paints, inks and fixative are thoroughly dry and will not transfer.
2. Place the unit face down on a clean protective surface.
3. Locate the legend access slot along the right side of the cover.
4. Remove the tape from the existing legend and then pull the legend out.
5. Slide in the new legend (refer to Figure 11).
  - be gentle
  - avoid wrinkling, which makes it hard to push the legend in
  - if the legend moves around too much, put a curl in the paper
6. Once installed, tape the end of the legend to the cover to secure it.

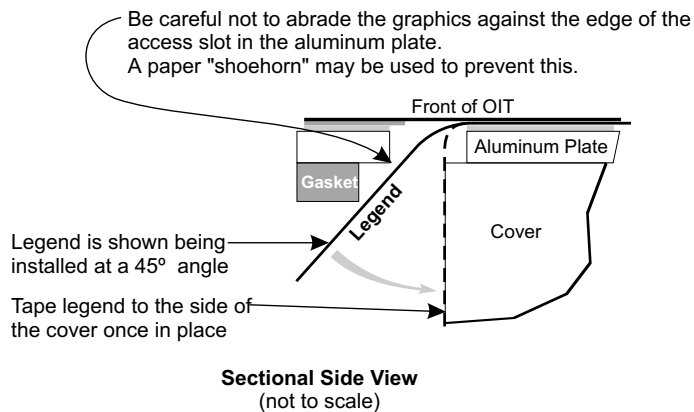


Figure 11 Custom Keypad Legend Installation

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## 1. Safety Warnings



**WARNING Hazardous location environment.** This unit is suitable for use in Class I, Division 2 groups A, B, C and D or Non-Hazardous locations only.



**WARNING** All input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.



**WARNING Explosion hazard.** Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.



**WARNING Explosion hazard.** Do not connect more than one main power supply to any one fuse or circuit breaker.



**WARNING Explosion hazard.** Substitution of components may impair suitability for Class I, Division 2.

### 1.1. Hazardous Locations

Install the MicroOIT terminal using publication NFPA 70E, Electrical Safety Requirements for Employee Workplaces as a guide. Be certain to follow all directions for installing and connecting DC power to the MicroOIT.

When used in a hazardous environment, the ultimate enclosure must be in accordance with Class I, Division 2 wiring methods as described in the National Electrical Code (ANSI/NFPA 70).

All peripheral equipment must be suitable for the location in which it is used.

Use only a Class 2 power source as described in the National Electrical Code (ANSI/NFPA 70).



**WARNING** Use only with Class 2 power source limited to 30 VDC open circuit and 8A short circuit.

### 5.3. Creating a Computer-Generated Slide-In Legend

The dimensions in Figure 10 can be used to create a computer generated legend.

When creating:

- Dimensions are in inches [mm].
- Recommended key size is 0.500 inches [12.7 mm] square.
- **NOTE:** *Pressing the center of the switch is critical for switch actuation.*
- Background colors should extend to the upper and lower edges of the legend and to the 2 vertical lines marked "BACKGROUND."
- All text and graphics should be within the dashed rectangle.

When printing:

- Use only non-glossy stock which is 0.004 - 0.008 inches (0.1 - 0.2 mm) thick.
- Check printing accuracy with the printed check dimension.

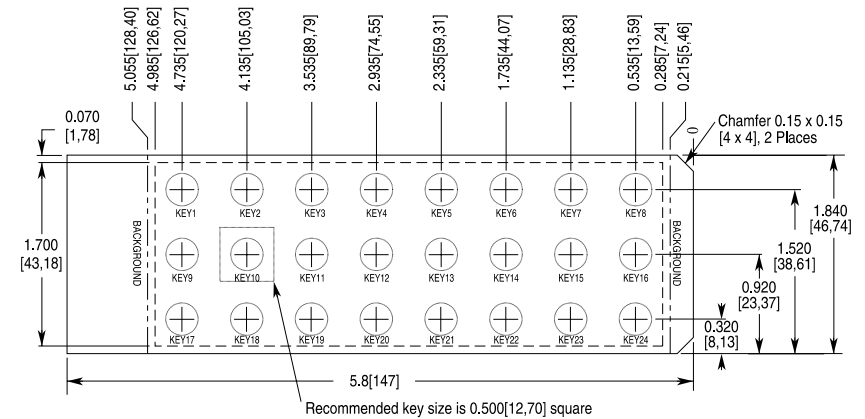


Figure 10 Computer-Generated Legend Dimensions

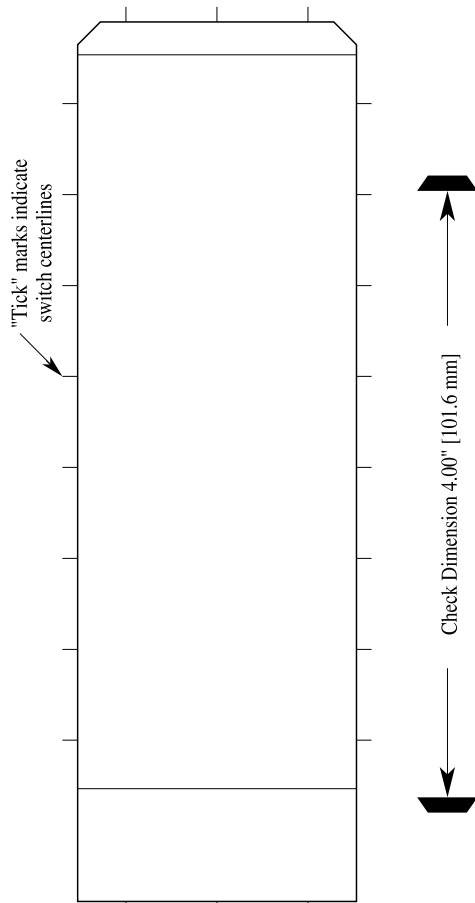


Figure 9 Photocopy Legend Master

## 2. Control Panel Design Guidelines

The following guidelines are intended to illustrate proper installation of the OIT to help minimize electrical noise, which may hamper normal operation. *It is the responsibility of the customer to ensure that all wiring and other components used in the control system meet Class 1, Division 2 requirements. This installation manual is intended only as a general guide to be used in conjunction with the appropriate Class 1, Division 2 installation and wiring requirements. The customer is ultimately responsible for proper installation.*

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.

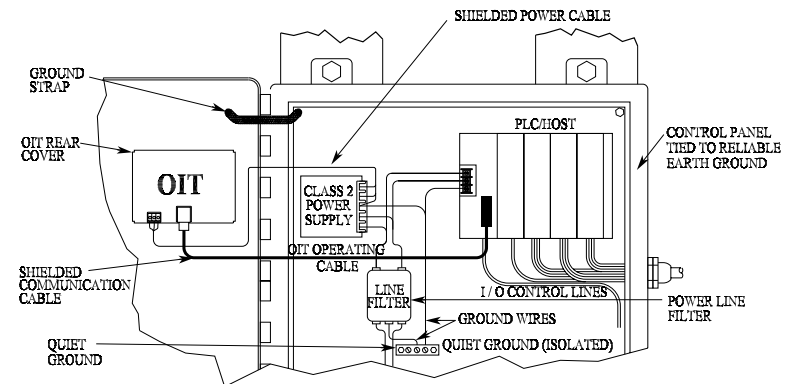


Figure 1 Control Panel Example

### 2.1. Control Panel Grounding

- The control panel should be connected to a good, high-integrity earth ground both for safety considerations and shielding purposes. This must be a reliable earth ground with a low-resistance path. The ideal earth ground would be a copper grounding rod located close to the OIT and the 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.

## 2.2. Power Supply Selection

- The power supply used to power the OIT should have an output between +12 and +30 VDC, meeting Class 2 power requirements. The voltage should measure between +12 and +30V at the OIT between Pins 1 and 2 of the power connector. A 24 VDC, 1.2 amp linear power supply dedicated to the OIT is recommended.
- The power cable for the OIT should be 18AWG 2-conductor stranded wire with a shield wire and protective shield (foil or braid). The shield of the OIT power cable must be connected to earth ground at both ends of the cable. Please refer to the “Connect OIT to Power” section for more information.
- A power line filter installed at the AC input to the OIT 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 three amps with common mode and differential mode attenuation.

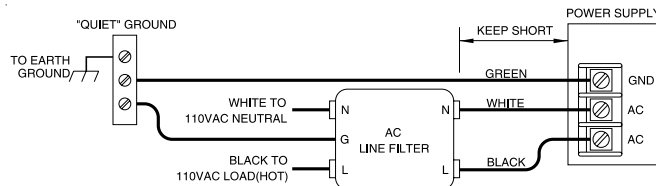


Figure 2 Power Line Filter Connection

- The power supply that provides power to the OIT should not be used to power switching relays or solenoids unless noise filter caps are connected to each relay.

## 2.3. OIT Cable Routing

- Input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.
- Always route the OIT communication cable and power cable away from any AC voltage or PLC/host control wires.
- Never bundle the OIT cables together with 120 VAC power wires or with relay wiring.
- Try to keep at least 8 inches (20 cm) of separation between the OIT cables and other power wiring. If voltages greater than 120 VAC are used in the system, greater separation is required.
- If the OIT cables must come near AC wiring, make sure they cross at 90 degrees.
- Running AC power wires in a separate grounded conduit is the preferred method for electrical noise reduction.

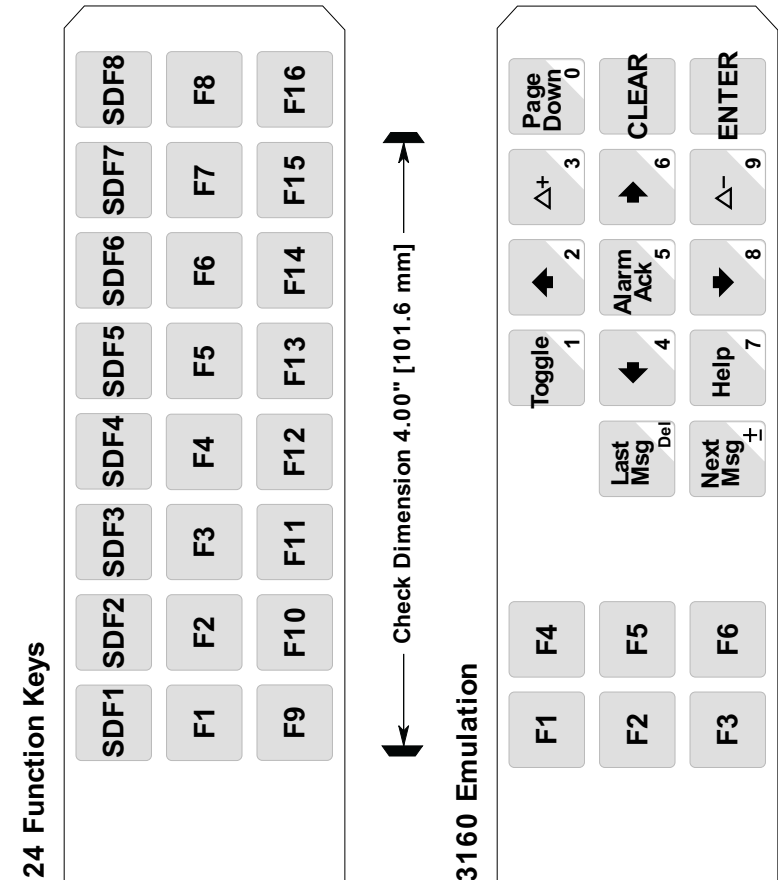


Figure 8 OIT3165/4165 Predefined Keypad Templates



## 5. Custom Keypad Slide-In Legends

The OIT3165 and OIT4165 have a graphic overlay covering the keypad. This overlay contains a clear window that allows you to insert your own legend to customize the keypad's text, colors, and graphics. This legend can be inexpensively made and is environmentally sealed when installed.

The slide-in legend can be made on any non-glossy stock between 0.004 inches (0.1 mm) and 0.008 inches (0.2 mm) thick by using any of the following methods:

- Photocopy one of the predefined keypad templates.
- Photocopy the blank legend and hand illustrate.
- Use the dimensions to create a computer generated legend.
- Use our Legend Generator software to create a computer generated legend. Available from our web site at [www.maple-systems.com/tech.htm](http://www.maple-systems.com/tech.htm).

### 5.1. Predefined Keypad Templates

If you have chosen one of the predefined keypad templates in OITware-200, you can photocopy the corresponding slide-in legend from Figure 8.

### 5.2. Blank Legend for Photocopying

The blank legend in Figure 9 can be photocopied and hand illustrated.

When photocopying:

- Use only non-glossy stock which is 0.004 - 0.008 inches (0.1 - 0.2 mm) thick.
- Check photocopy accuracy with the printed check dimension.

When illustrating:

- Use the tick marks to locate the switch centers. Refer to the computer generated legend dimensions if unsure.

**NOTE:** *Pressing the center of the switch is critical for switch actuation.*

- Recommended key size is 0.500 inches [12.7 mm] square.
- Background colors should extend to the solid lines.
- All text and graphics should be 0.07 inches [1.78 mm] within the solid lines.

**NOTE:** *Do not affix anything to the legend using glue, tape, stickers, etc.*

- Keep the lengths of the OIT cables as short as possible. Do not coil excess cable and place it next to AC powered equipment.

### 2.4. Other Steps to Improve Noise Immunity

- Always install the OIT's rear cover. This provides a shield against electrical noise which can be generated in the control panel by relays, motors, power lines, and/or high frequency equipment. Ensure that all rear cover mounting screws are properly secured.
- Any equipment used in the enclosure that operates at high frequency or high current levels can be covered with a grounded metal shield.

### 3. OIT Installation

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

Your Maple Systems OIT is designed to connect easily to your PLC. External connectors provide quick connection for power and communications wiring.

- There is one serial port with an RJ-45 shielded jack. This port is used to connect to the PLC and to configure the OIT.
- A separate three-position terminal block is supplied to provide power to the OIT.

#### 3.1. Create Custom Slide-In Legend

Please refer to the “Custom Keypad Slide-in Legends” section for details.

#### 3.2. Prepare Panel for OIT Mounting

The OIT3165 and OIT4165 are mounted to a control panel from the front. For a proper NEMA 4/12 seal, you will need:

- A panel with a maximum thickness of 0.125 inches (3.2 mm).
- A panel with a minimum thickness of 16-gauge (0.059 inches; 1.5 mm) steel or 10-gauge (0.102 inches; 2.6 mm) aluminum. Thinner panels may bow between the mounting studs, requiring the use of a stiffener on the rear.
- The surface of the panel, where the panel comes into contact with the gasket, must be free of scratches, pits, and other features that prevent the gasket from sealing properly.

The diagram in Appendix D shows the dimensions of the panel cutout required for proper installation. This panel cutout illustration is shown actual size and can be photocopied to be used as a template. Check photocopy accuracy with the printed check dimension. The panel cutout should be cleaned and deburred before the OIT is installed.

#### 3.3. Enclosures

Allow enough spacing within an enclosure for adequate ventilation. For some applications, you may have to consider heat produced by other devices within a panel. The ambient temperature around the terminal must be maintained as specified.

### 4. OIT Configuration Wiring

The OIT3165 and OIT4165 must be configured for a particular protocol before use. The OITware-200 or STEPware-100 software (used on a computer with Windows 3.1 or later) is used for OIT configuration. For detailed instructions on installing and using the software, please refer to the software documentation.

#### 4.1. Connect OIT to PC for Configuration

To configure the OIT using Maple Systems’ configuration software, remove the PLC/host cable from the serial port on the OIT and connect the OIT to the computer using an RS-232 serial communications cable (P/N 7431-0096, purchased separately from Maple Systems). The configuration cable should be connected to the proper COM port on your computer, then attached to the serial port on the OIT. See Figure 7 below for serial port pin assignments.

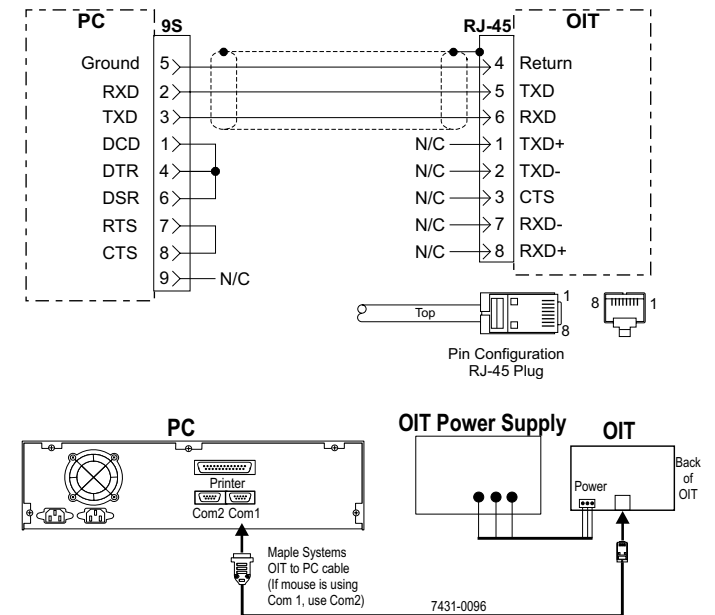


Figure 7 OIT3165/4165 to PC RS-232 Communication

3. Route the communication cable to the PLC/host. Refer to the "OIT Cable Routing" section for more information.
4. Connect the other end of the cable to the PLC/host and tighten the cable screws.

PIN#	FUNCTION
1	TXD+
2	TXD-
3	CTS
4	RETURN
5	TXD
6	RXD
7	RXD-
8	RXD+

Figure 6 Port 1 Pin Outs

5. Connect the green shield wire from the cable to earth ground (chassis ground) on the PLC. If this wire is not present, the ground connection was made inside the connector.

### 3.4. Mount OIT to Panel

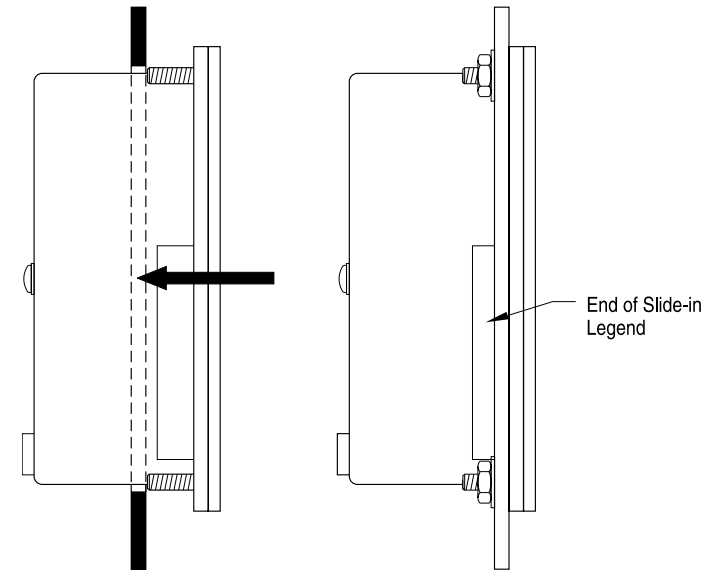


Figure 3 OIT3165/4165 Panel Mounting

#### STEPS

1. Gently position the OIT with the studs through the panel mounting holes.
2. Secure the OIT by installing the four #6-32UNC mounting nuts using a 5/16 inch socket wrench or nut driver.

**CAUTION:** Do not torque the 4 mounting nuts to over 15 pound-inches. Over torquing can strip the threads or pull the studs loose.

**RE-INSTALLING:** Because the gasket will take a "set" to the panel, be sure to re-install any OIT to the same panel cutout when a NEMA 4/12 seal is required.

### 3.5. Connect OIT to Power



**WARNING** Use only with Class 2 power source limited to 30 VDC open circuit and 8A short circuit.

The power cable for the OIT should be 18AWG 2-conductor wire with a shield wire and protective shield foil. Maple Systems sells cable P/N 6030-0009 by the foot for user-built power cables.

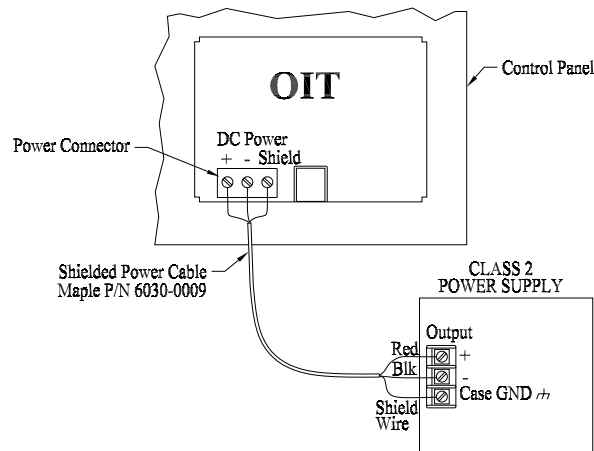


Figure 4 OIT3165/4165 Power Supply Connection

#### STEPS

1. The power cable should not be any longer than necessary. Prepare the cable as follows:
  - a) Cut the power cable to the appropriate length.
  - b) Strip the cable shield back to expose the two insulated wires and the bare shield wire on both ends of the power cable.
  - c) Strip the insulation from the two insulated wires. For the OIT end, this is 0.27 inch (7 mm).

2. Install the wires into the Class 2 power supply as follows (colors shown are for Maple Systems Cable P/N 6030-0009):

COLOR	POWER SUPPLY	OIT
Red	+ Output	(+)
Black	- Output	(-)
Shield Wire	Case Ground	Shield

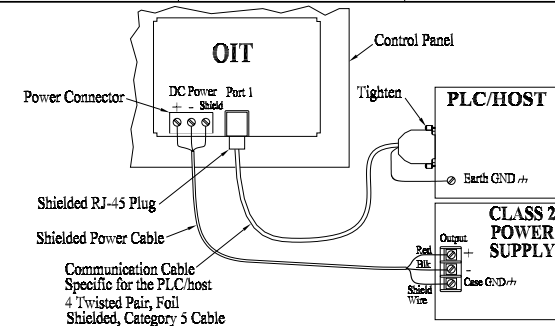


Figure 5 OIT3165/4165 PLC Connection

**NOTE:** The power connector on the OIT has M3 slotted screws.

### 3.6. Connect OIT to PLC/Host

Each PLC/host supported by Maple Systems has its own wiring requirements. Maple Systems offers pre-constructed OIT-to-PLC communication cables for most PLCs. Most cables are available for same day shipment from Maple Systems. They are built and tested for high reliability and are strongly recommended. Maple Systems also builds custom cables—contact the factory for information. Components and instructions necessary to construct your own OIT-to-PLC communications cables are also available. Refer to Maple Systems' Price List or web site ([www.maple-systems.com](http://www.maple-systems.com)).

**NOTE:** Refer to the *ASCII Slave Protocol Guide* or the *STEP1 Protocol Operation Manual* for information on constructing OIT-to-ASCII host communication cables.

#### STEPS

1. Connect the RJ-45 plug end of the communication cable into the serial port on the OIT.
2. Ensure that the locking tab has secured the plug.