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PanelMate® Series 1000

Hardware Installation Guide

Cutler-Hammer

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PanelMate Series 1000
Hardware Installation Guide

Cutler-Hammer
P.O. Box 6166
Westerville, OH 43086-6166
(614) 882-3282

06/08/98

P/N 01-00310-01

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Preface

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Chapter 1
Introduction

In this chapter you will learn:

- How to use this manual
- Whom this manual is written for
- Which typographical conventions are used

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How to use this Manual

Welcome to the Cutler-Hammer PanelMate Series 1000 Hardware Manual. The manual contains everything you need to know about PanelMate Series 1000 assembly, installation, operation, and maintenance.

This manual is written for system engineers, plant engineers, plant maintenance personnel, Cutler-Hammer Automation, and any persons who may be involved in configuring screens or installing and maintaining a PanelMate unit. This manual is not written for plant personnel who will be using the PanelMate unit to control factory operations. The task of informing plant operators how to use the PanelMate unit in specific situations is left to those who configured the screens.

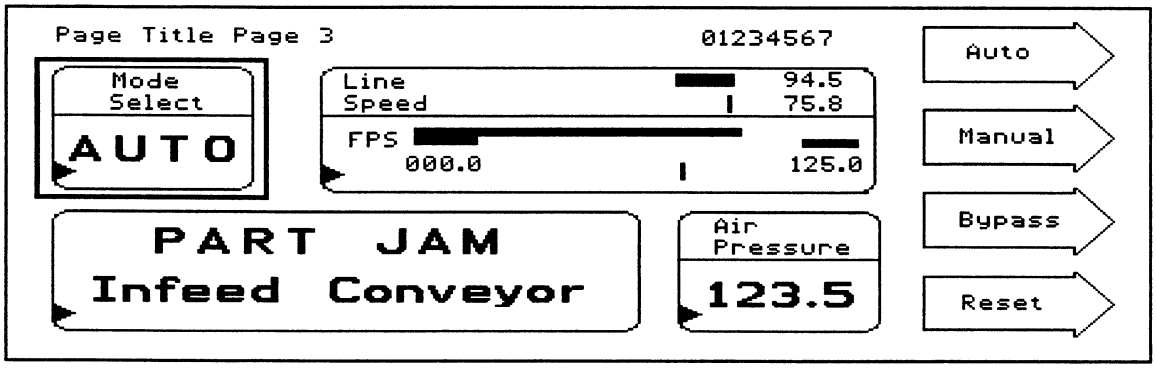


Figure 1-1 Example Page

Typographical Conventions

Certain typographical conventions are used consistently in this manual. They include:

< >	Delineates a specific key on the personal computer
<Return>	Refers to the enter or return key on the personal computer
Cursor arrow keys	Refers to the up, down, right and left arrow keys located on the numeric keypad of the personal computer
[ ]	Delineates a PLC word or bit reference
PLC	Abbreviation for programmable logic controller

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Chapter 2
Hardware Checkout Overview

In this chapter, you will learn:

- How to set up the PanelMate Series 1000 for checkout
- How to check system health

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Unpacking

Report any damage to the carrier who delivered the equipment and immediately call the Cutler-Hammer Customer Service Department at (614) 882-3282.

Check packing cartons for all items shown on the packing list.

Carefully remove all equipment from the packing cartons and inspect all parts for damage in shipment. Keep the cartons and packing materials for future shipment. The Interstate Commerce Commission has a time limit on reporting concealed damage.

Please check to be certain that all items are present:

PanelMate Series 1000

- 1 PanelMate Series 1000 unit
- 1 Hardware Manual
- 1 Shipping kit (plastic bag) containing:
- 1 Packet containing:
  - 10 #6 nuts, 10 #6 washers
  - 1 three-terminal DC power connector
- 1 Cutout/torque drawing

If you ordered a Support Kit as an accessory, it will be packaged separately:

- 1 Transfer Utility with manual
- 1 Shipping kit (plastic bag) containing:
  - 1 Packet containing: 10 #6 nuts, 10 #6 washers, and 1 three-terminal DC power connector
  - 1 Cutout/torque drawing

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Check System Health

You may wish to test your unit before you install it in your industrial enclosure. This section outlines the steps required to set-up the PanelMate unit on a work surface for check-out before installation. You will be performing the following procedure:

1. Connect to 24V DC power. This will immediately start the unit.
2. View the demonstration screens.
3. Execute the system diagnostics:
   a. Perform Display Tests
   b. Perform Keypad Test
4. Enter the Run Mode.

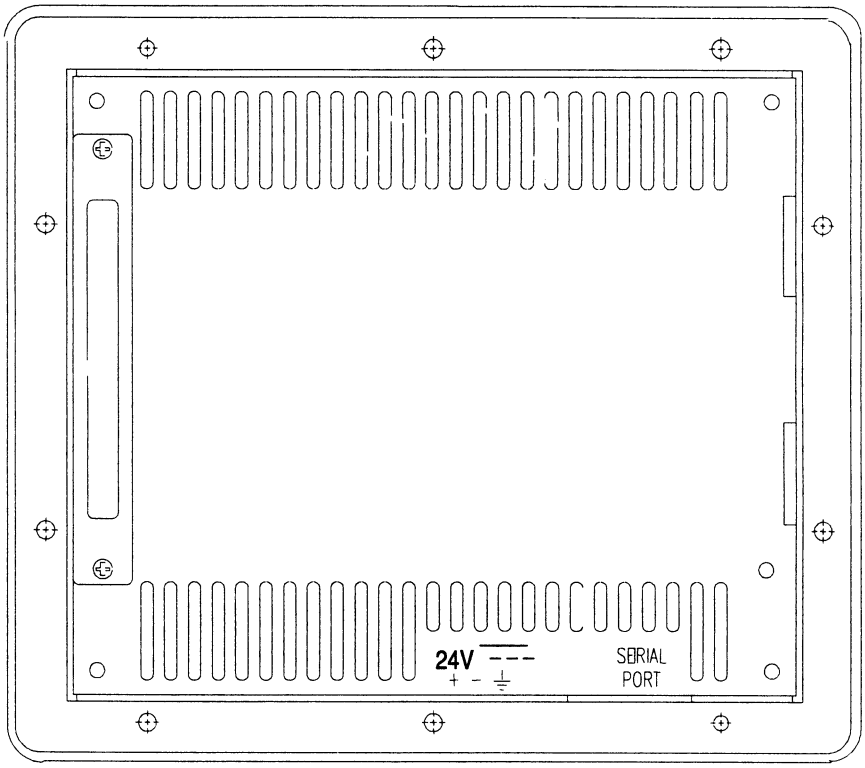


Figure 2-1 PanelMate Series 1000 Rear View

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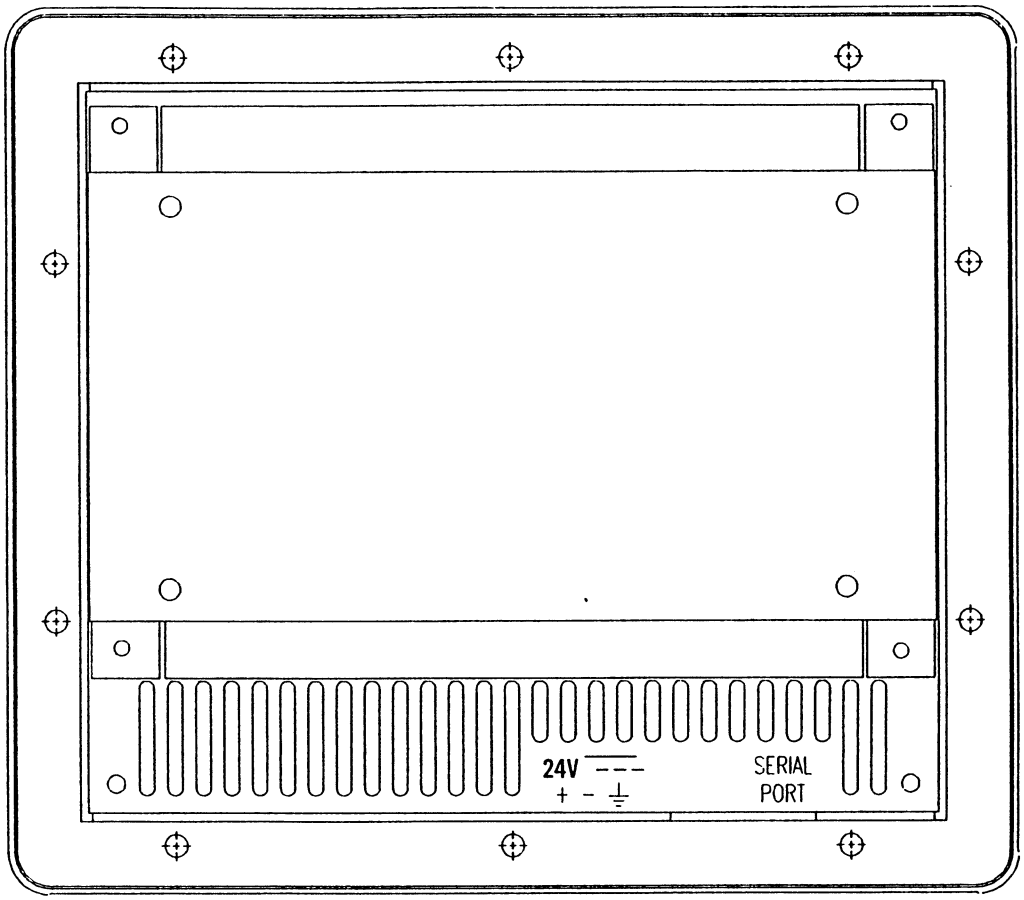


Figure 2-2 PanelMate Series with AcceleratI/On Rear View

Connect DC Power

The DC power connector receptacle is located on the bottom of the PanelMate unit. The unit operates at 24V DC-15%/+20%. The removable connector (Fig. 2-3) is shipped in a plastic bag. Connect your DC power with user-supplied wiring. Typical examples for connection to a DC power supply are shown in Figures 2-4 and 2-5.

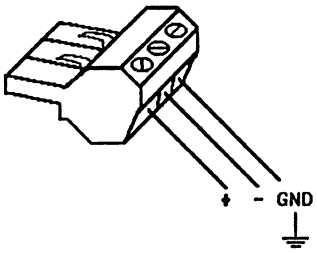


Figure 2-3 Three-Position DC Power Connector

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Note A PanelMate unit could be damaged if it is connected to voltages outside the range of 18 to 30 VDC. The unit is fully protected against polarity reversal - it will not operate if the polarity is reversed.

Note Power Conditioning may be required when the PanelMate Series 1000 is installed in areas where the power quality is poor.

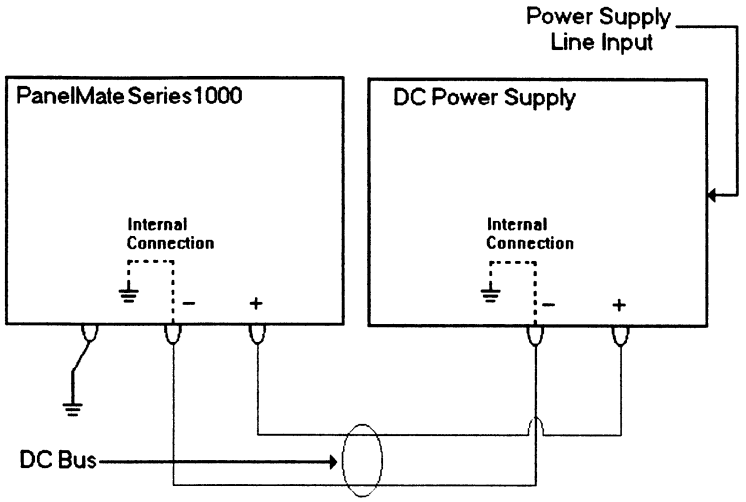


Figure 2-4 Connection With Grounded Supply

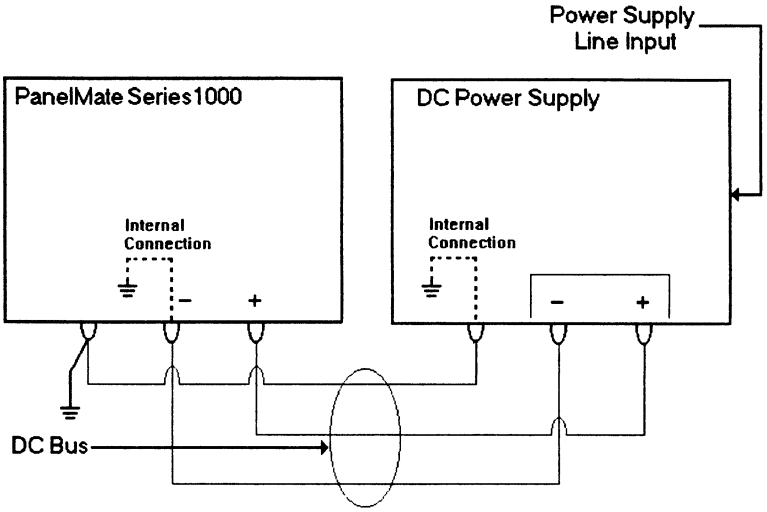


Figure 2-5 Connection With Floating Power Supply

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Power Up the Unit

Apply power to the unit. The PanelMate unit performs approximately 20 seconds of internal diagnostic checks. The screen will first display a listing of the diagnostic checks as it executes them. If there is a failure see Chapter 5.

After the unit completes the diagnostics, it will run the demonstration program.

Demonstration Program

The PanelMate Series 1000 has a self-contained demonstration program which simulates the template functionality as if the unit is connected to a PLC. You may examine the screen to review the product features. The demonstration software contains a software controlled contrast adjustment. To adjust the contrast, depress the <Cancel> button and select the control button labeled "Contrast". Use the control buttons labeled "Lighter" and "Darker" to adjust the display contrast. To save the new setting , depress the control button labeled "Save Setting". To revert to the previous contrast value, press the <Cancel> key. The PanelMate unit will return to the last saved contrast level after power is cycled to the unit.

To execute the system self-tests, proceed to the next topic.

Execute the System Diagnostics

To execute the system diagnostics, remove power from the unit. Then re-apply power and immediately press and hold the <Cancel> key on the front of the unit until the system diagnostic screen is erased. Once the diagnostics are completed, the system will be in the Offline Mode. The screen will display four choices. Select a template and press the control button labeled "Execute".

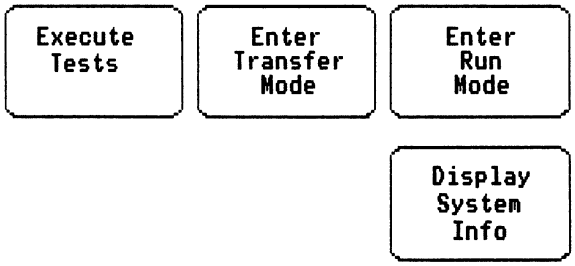


Figure 2-6 Offline Mode Menu

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Execute Tests

Select the template labeled "Execute Tests" with the TouchPanel located below the display and then depress the control button labeled "Execute". A new page of choices will appear. You can test the serial port, keypad, or display by selecting the appropriate template and then depressing the control button labeled "Execute".

Perform Serial Port Test

This test is only run if a problem is suspected. This test actually checks the serial port hardware and requires two special loopback test plugs that the user must supply for proper operation. To test the RS232 driver, the D-shell loopback plug must jumper pin 2 to 3. To test the RS422 driver, the D-shell loopback plug must jumper pin 1 to 4 and also pin 6 to 9.

To run the test, select Serial Port Test and press the control button labeled "Execute". Place the RS232 loopback plug on the serial port and press the top control button. Follow the instructions on the screen and note the test results. Follow the instructions using the RS422 loopback plug. Press the <Cancel> key to exit the test.

Perform Keypad Test

Select Keypad Test and press the control button labeled "Execute". As a key is pressed, it will be identified on the page display. Use this test to verify keyboard operation. Test the <Cancel> key last as it will exit the test mode.

Perform Display Tests

Select Display Test and press the control button labeled "Execute". The new page will display an alternating checkerboard pattern that will enable you to verify that every pixel is functional. To leave the test, press <Cancel>.

Perform Watch Dog Test

Select Watch Dog Test and press the control button labeled "Execute". The new page will display a "Wait for Watch Dog Timeout" message on your screen. If the test is successful, the "Press Cancel Key to Continue" message will appear. Pressing the <Cancel> key will reset the PanelMate unit and return it to the Main Offline Mode Menu.

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If the test is not successful, the "Watch Dog Failed, Cycle Power to Reset" message will be displayed. A PanelMate unit that has failed should not be used and should be returned to Cutler-Hammer for repair.

Test Completion

This completes the internal system diagnostics which are available for you to check-out your unit. To exit the diagnostics page, press the control button labeled "Exit" which will return to the Offline Mode page.

Enter the Transfer Mode

To download and upload files or read system information, the online unit must be in the transfer mode. The PanelMate unit will remain in the ready state until the configuration software has initiated the transfer. Once in the transfer mode, the PLC driver firmware and user configuration files can be downloaded to the PanelMate unit from the Transfer Information selection in the configuration software.

You may change the default communication rate in the PanelMate unit from the configuration software. (The default is 9600 baud.).

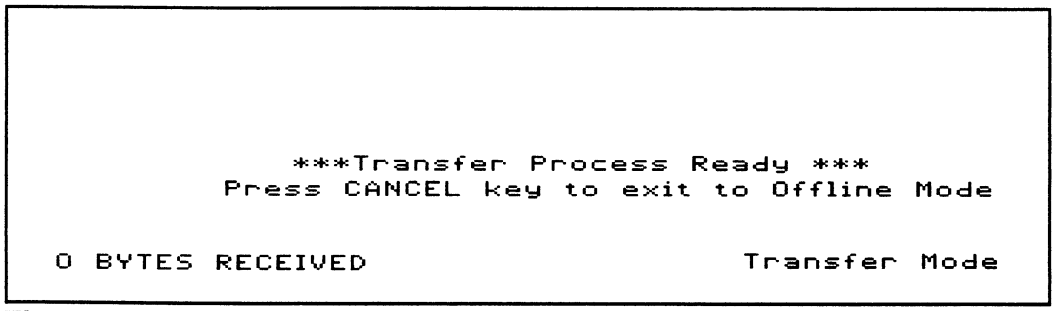


Figure 2-7 Transfer Screen

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Enter Run Mode

Run mode allows communication between the PanelMate unit and the PLC of your choice. Operation is determined by the configuration which has been downloaded to the PanelMate unit.

The Run Mode lets you run the configuration downloaded to the PanelMate unit, and communicate with the PLC of your choice.

Note **Response to power interruption:** During normal Run Mode operation, the PanelMate unit will respond predictably when power is restored after a power interruption.

1. The PanelMate unit performs its internal diagnostic check, displaying a list as the checks are executed.
2. The PanelMate unit then returns to the Run Mode and displays the startup page defined by the configuration previously loaded into the unit.

Display System Info

This selection displays the current configuration information from the PanelMate unit.

```
USER CONFIGURATION
 Name:              G_SHOW4.PC0
 Version:           X.XX
 Date/Time:         12/05/91   15:47
 Free Bytes:        40932
 Used Bytes:        24604
 Options:           10 Page, Graphics
INSTALLED DRIVER
 Company/ID:        Cutler-Hammer Automation
 Product:           PanelMate 1000
 Version:           X.XX
 Driver:            A-B
 Options:           Graphics
```

Figure 2-8 Display System Information

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Chapter 3
Installation in an Industrial Enclosure

In this chapter you will learn:

- How to install the PanelMate Series 1000 in an industrial enclosure
- How to connect DC Power

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Installation in an Industrial Enclosure

The PanelMate Series 1000 is designed to be used on the factory floor, mounted in an industrial enclosure. This section contains the information about installing the PanelMate Series 1000 in an enclosure.

The instructions in this section are based on the assumption that you have already verified unit operation by performing the system health tests defined in Chapter 2.

PanelMate Series 1000 Enclosure Sizing

Review the PanelMate Series 1000 Outline and Panel Cutout and Torque drawings shown on the following pages. Use this information to determine the enclosure size for your application. There are a number of factors to consider when selecting an enclosure in which to house the PanelMate Series 1000. Although designed to withstand harsh environmental conditions, you must not expose the unit to conditions which are beyond the detailed specifications found in Appendix A. Appendix B contains detailed information taken from enclosure manufacturers which contains guidelines concerning enclosure sizing and temperature specifications.

In order to provide for convection cooling, we recommend a minimum 2-inch clearance above and below the unit and a 1-inch clearance on either side of the unit when installed in an industrial enclosure.

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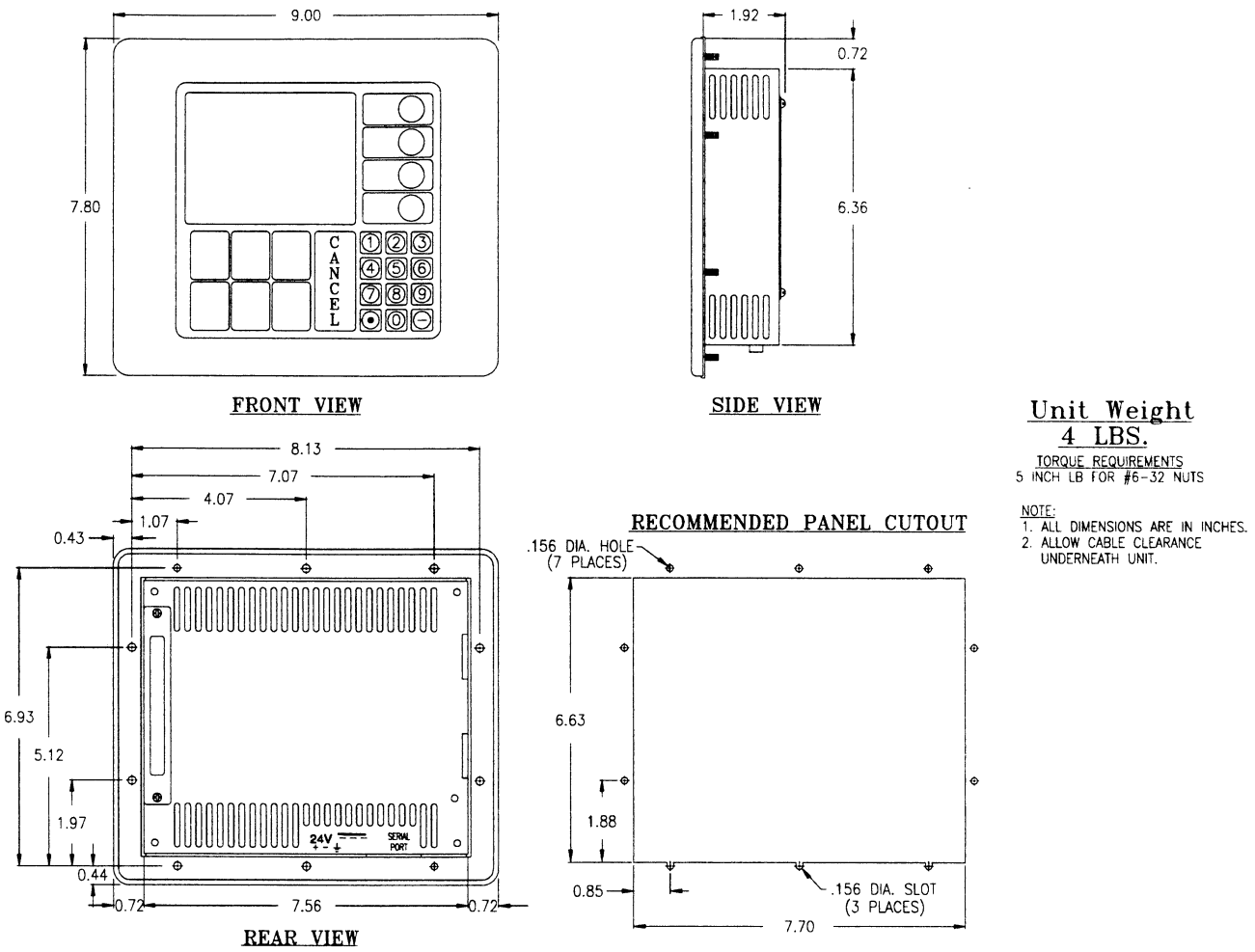


Figure 3-1 PanelMate Series 1000 Outline

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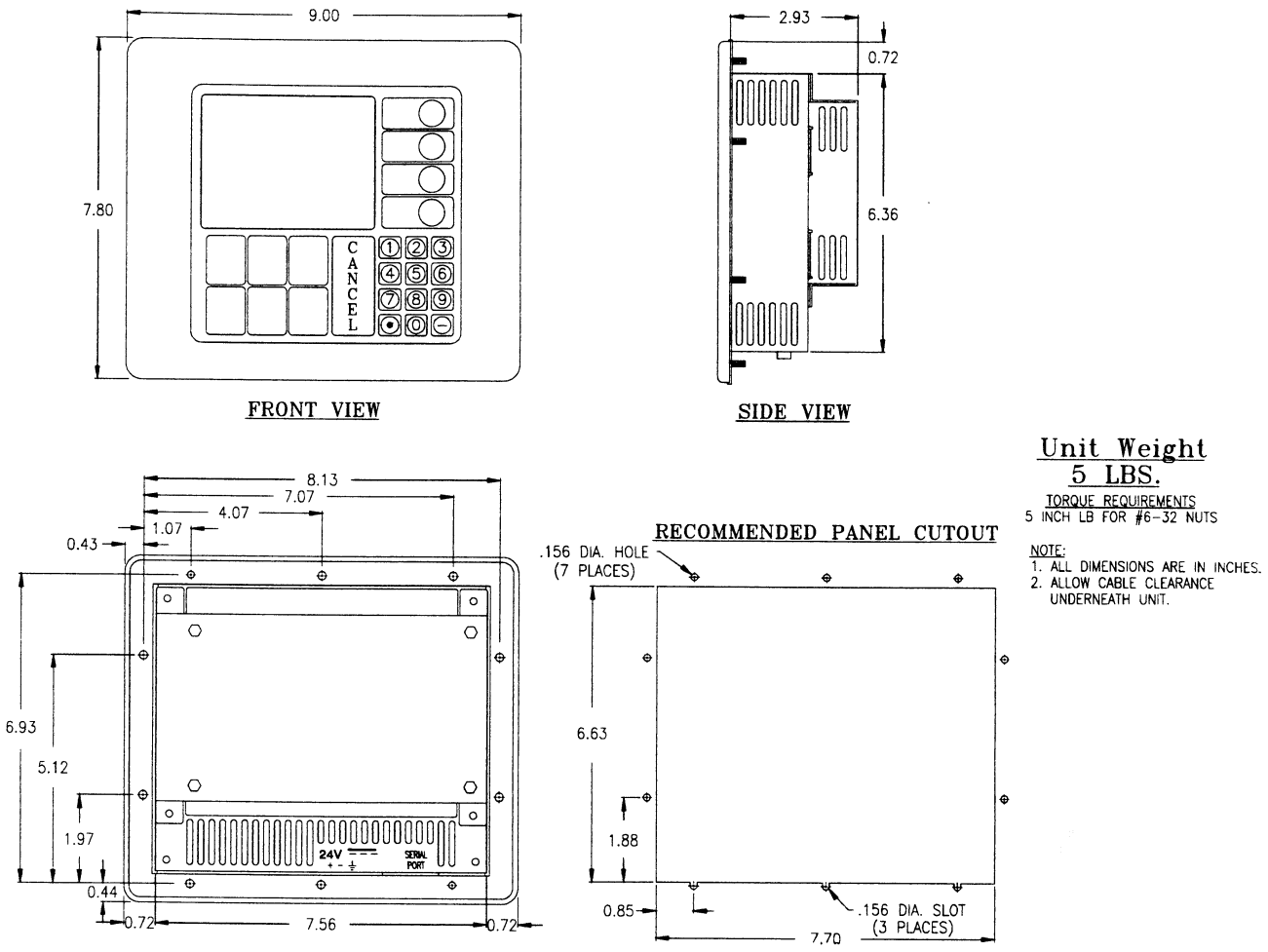
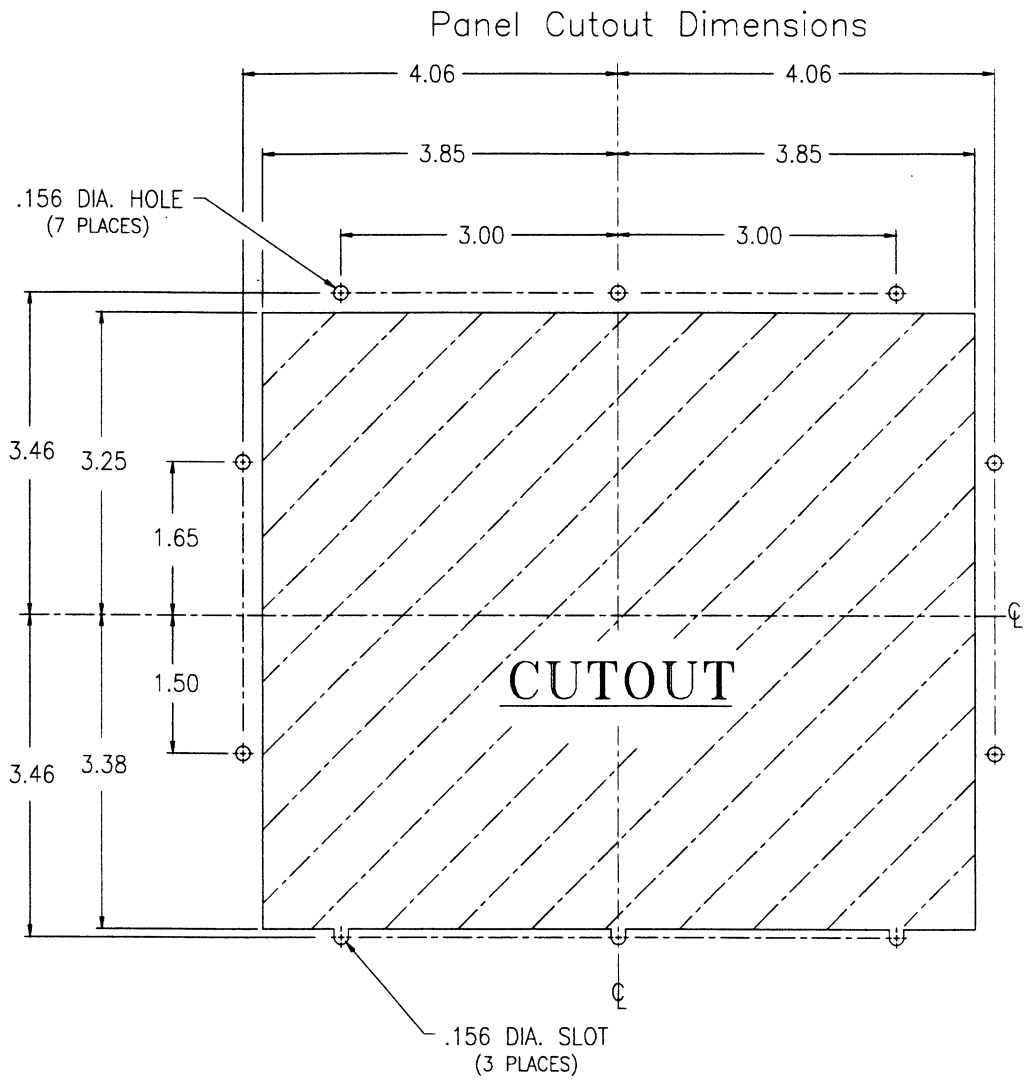


Figure 3-2 PanelMate Series 1000 With Acceleratl/On Outline

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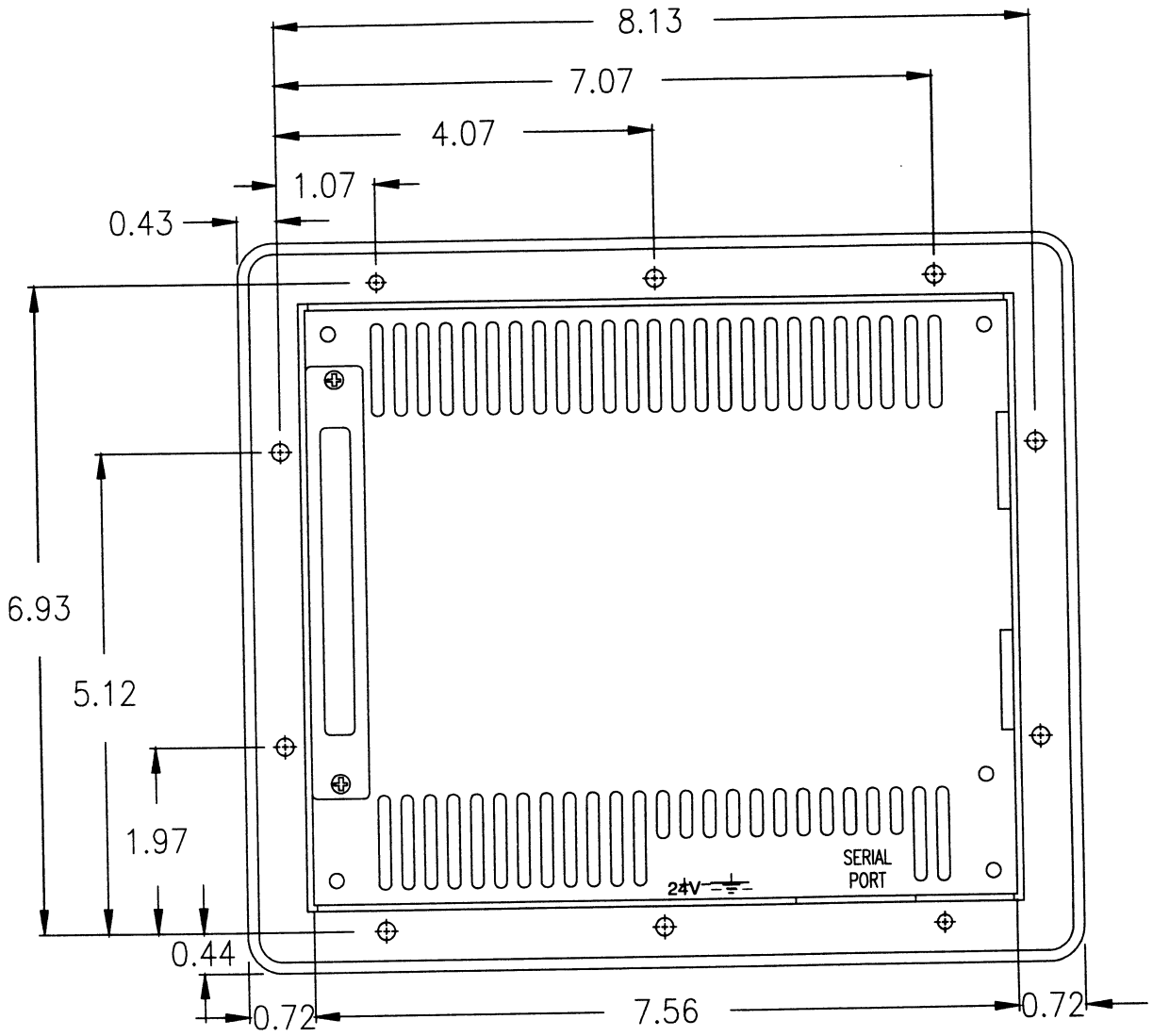
CAUTION: Care should be exercised when tightening the nuts. The fasteners must be tightened enough to obtain a proper seal, but not tightened to the point where the threads are stripped from the welded steel studs.

5 INCH-POUNDS FOR #6-32 NUTS

Note All units in inches

Figure 3-3 PanelMate Series 1000 Cutout & Torque Limits

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Note All units are in inches

Figure 3-4 PanelMate Series 1000 Rear View

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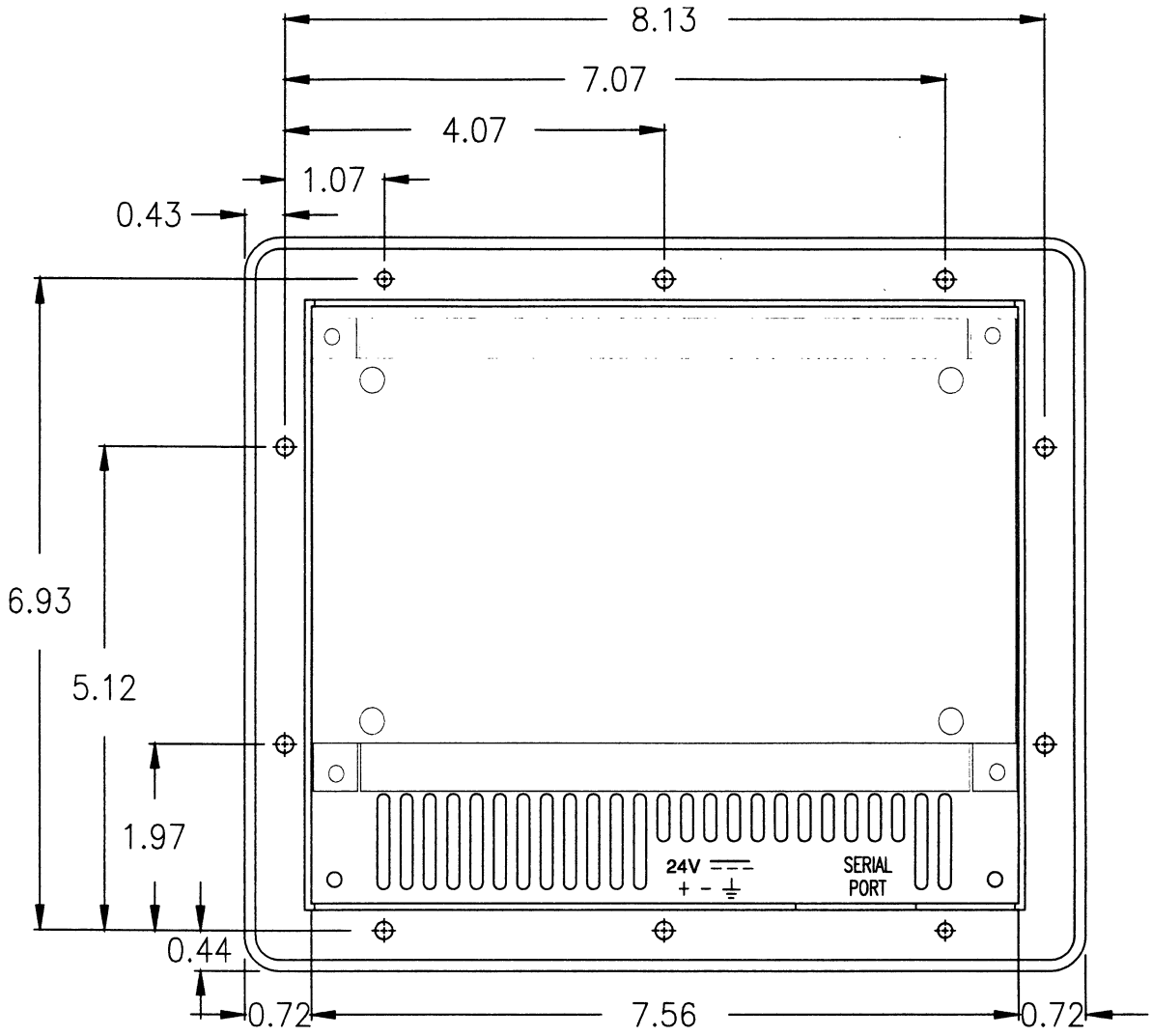


Figure 3-5 PanelMate Series 1000 With AcceleratI/On Rear View

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Install PanelMate Series 1000 in the Enclosure

Make cutouts in the enclosure as show in figure 3-3. To install the PanelMate Series 1000 in an enclosure, use the following procedure:

1. Go to the back of the unit. Remove DC power and disconnect any other connectors.
2. From the front, insert the unit in the cutout and fasten it with the ten #6 washers and nuts that are supplied with the unit.

Caution Care must be exercised when tightening the nuts. The fasteners must be tightened enough to obtain a proper seal, yet not be tightened enough to strip the threads from the welded steel studs. Do not exceed 5 inch-pounds.

3. You may now re-connect DC power and any other connectors.

Connect DC Power

The DC power connector receptacle is located on the bottom of the PanelMate unit. The unit operates at 24V DC. The removable connector is shipped in a plastic bag. Connect your DC power with user-supplied wiring.

Note Power conditioning may be required when the PanelMate Series 1000 is installed in areas where the power quality is poor.

Recommended minimum wire size = 0.82 mm^2
(18 AWG)

Caution Connecting the PanelMate unit to a power source outside the range of 18 VDC to 30 VDC may damage the unit. The unit is fully protected against polarity reversal.

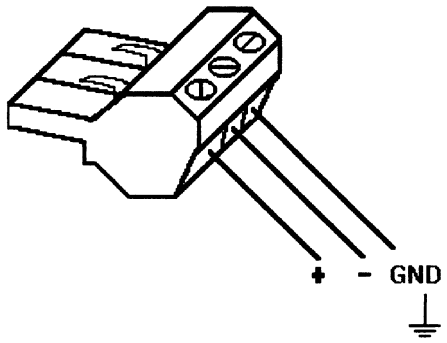


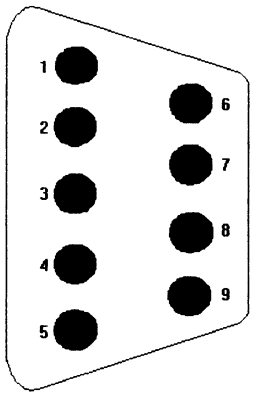
Figure 3-6 Three-Position DC Power Connector

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Connection to the Serial Port

The serial port may be used for a PLC (or Host) communications or for connection to a personal computer for upload or download.

Port is DB9S (Socket)



1	RS422 Transmit Data (+) (Output)
2	RS232 Receive Data (Input)
3	RS232 Transmit Data (Output)
4	RS422 Receive Data (+) (Input)
5	Signal Ground
6	RS422 Transmit Data (-) (Output)
7	RS232 Request to Send (Output)
8	RS232 Clear to Send (Input)
9	RS422 Receive Data (-) (Input)

Connection to a Personal Computer

The serial port may be used for communications with a PLC (or host) or to a personal computer for upload and download. This accessory includes a 9-pin to 9-pin cable for connection between a PanelMate Series 1000 and a serial device. It also includes a 9-pin to 25-pin adapter to permit connection to your serial device. The cable has the following pinouts.

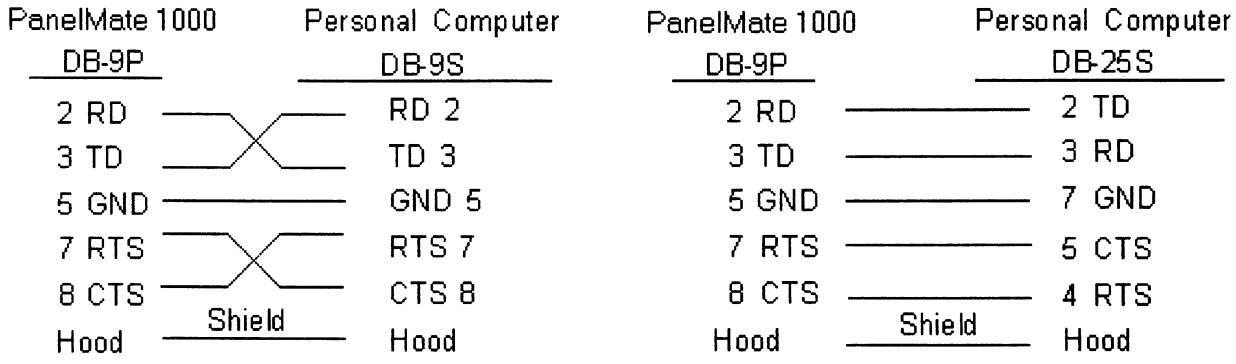


Figure 3-7 Serial Transfer Cable

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Chapter 4
Regular Maintenance

In this chapter, you will learn:

- What regular maintenance the PanelMate Series 1000 requires

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Regular Maintenance

Very little regular maintenance is required to keep your PanelMate Series 1000 in perfect running condition.

The face of the unit should be cleaned, whenever needed, with any common, non-abrasive cleaning product.

Every 3 to 6 months, run all the system health checks that are provided in the system. These include the Display Tests and Membrane Keypads Test. Refer to Chapter 2 for directions on running these system health checks.

It is best to mount the PanelMate Series 1000 in a closed industrial enclosure. However, if a PanelMate Series 1000 is operating in a dusty environment and is unprotected (e.g., mounted in a control panel whose door is often left open), periodically use forced air to blow off any dust that may have accumulated on the circuit boards. Be sure to disconnect power before conducting this procedure.

There are no user replaceable fuses or batteries in the PanelMate Series 1000 unit.

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Chapter 5
Troubleshooting the PanelMate Series 1000

This section of the manual is provided to help you determine if problems you are having with the PanelMate unit can be readily solved on your own or require help from Cutler-Hammer's Customer Service Department.

Please try all recommended solutions of your problem before contacting your local distributor.

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Problems with the Display

No picture on the screen or screen is dull

Make sure the power is switched ON.

Make sure your power source is actually supplying power to the PanelMate unit.

Watchdog timeout message on a screen that says "Watchdog Timeout. Press Cancel key to continue"

A watchdog timeout error may indicate a problem with PanelMate hardware or it may be related to DC power. If problems persist, call your local distributor. Please have the unit's serial number ready for the distributor who serves your call.

Problems with the TouchPanel

Keyboard does not work

Check the integrity of the cable and connectors.

One or several membrane keys do not work

Use the Membrane Keyboard Test to check if the keys are sending a signal to the PanelMate unit. Refer to the Execute the System Diagnostics section in Chapter 2 for more information.

Problems when Transferring Memory

Cannot make a PC (Personal Computer) transfer

Make sure that the cable connecting the PC serial port to PanelMate Serial Port is the one sold by Cutler-Hammer.

Check the integrity of the PanelMate communications port. Do this by restarting the system (power off, then re-power) and noting the report of the power-up diagnostics.

Cannot download from the PC

The file you are attempting to load from the PC may be corrupted. Re-save the configuration to the PC, then try to transfer the configuration again.

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Appendix A
Detailed Specifications

In this chapter, you will learn:

- Specific information about the PanelMate Series 1000

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Main Processor

CPU	Motorola 68340 micro controller

Display

Type	LCD
Resolution	320 x 240 pixels (VGA-quality) monochrome

Environment

Temperature	Operating Ambient: Storage:	0º-50ºC -20º-60ºC
Humidity	20-85% noncondensing	
Pollution	Degree 1 - rated for exposure to dry or non-conductive pollutants only.	
NEMA Class	NEMA 4 or NEMA 12 when properly mounted in a correspondingly rated enclosure. NEMA 4X with the purchase of an Cutler-Hammer stainless steel housing option. Rated when properly mounted in a correspondingly rated stainless steel enclosure.	
Vibration	Operating: Non-operating:	2g at 10-500 Hz 2g at 10-500 Hz
Shock	Operating: Non-operating:	15g 30g
Altitude	Operating: Non-operating:	10,000 feet above sea level 30,000 feet above sea level
Noise Immunity	IEC-801-2, IEC-801-3, IEC-801-4, IEC-801-6	
Magnetic Field Influence	Unaffected by low level magnetic fields (IEC-801-8)	

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Electrical Requirements

Voltage	24 VDC, -15%/+20%
Current	0.5A with AcceleratI/On interface installed
Peak Inrush Current	35A (Duration less than 15 microseconds)

Serial Port

Rate	Selectable; 110 to 19,200 baud
	Serial port is DB9S (Socket)
	Serial port is selectable for RS232 or RS422 signal levels

Other

Weight	4 pounds 5 pounds with the AcceleratI/On interface
Equipment Heat	42 BTU/hr. (12 watts) with the AcceleratI/On interface Output

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Appendix B
Installation Guidelines

In this chapter, you will learn:

- Physical Installation Considerations
- Environmental Considerations
- Wiring Considerations

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Overview

This document explains important considerations for installation of the PanelMate Series 1000.

Physical Installation Considerations

Choosing where and how to mount your equipment is the first step in assuring its proper operation and long life.

The installation should protect your system from oil, dust, moisture, corrosive vapors, and other airborne contaminants. The front panel of the PanelMate Series 1000 provides a NEMA 4 or NEMA 12 rating when mounted in a correspondingly-rated enclosure. If you have purchased the NEMA 4X (stainless steel front panel) version of the PanelMate unit, it only provides this NEMA rating when mounted in a NEMA 4X enclosure.

When choosing an enclosure or mounting position, allow a good amount of free space around your unit. Leave at least two inches above and below the unit and one inch on either side. PanelMate units depend on this room to allow convection cooling of their interiors. Convection cooling draws a vertical column of air upward over internal circuitry through vents in the unit. This cooling air must not exceed 50°C (122°F). Placing a PanelMate unit on a horizontal surface blocks vents on the bottom of the unit, inhibiting convection cooling and causing damage to the unit.

Careful enclosure sizing is important for proper heat dissipation. Since other devices mounted in the same enclosure can also generate heat, consider the heat output of all equipment to be mounted in a given enclosure when choosing its size.

If the inside temperature of the enclosure is above the unit's recommended range (see table B-1), you can use filtered fans, heat exchangers, air conditioners, or switch to a larger enclosure to lower the temperatures. Keep in mind that your system will be more reliable and have a longer life if it is exposed to environmental conditions within the recommended range.

Since heat rises to the top of an enclosure, the temperature inside can vary greatly from the bottom to the top. A fan can be used to circulate air within the enclosure and maintain a more uniform temperature top-to-bottom.

Also remember to leave room for wiring, cabling connections, and access to the unit. Detailed panel cutout drawings are found in Chapter 3, Installation in an Industrial Enclosure, of this product manual for easy reference.

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Construct your enclosure of 14 or 16 gauge steel to help guard your unit against electromagnetic interference. It also provides good heat dissipation and proper structural support.

If an air-purged enclosure is used, it is recommended that the inside/outside pressure differential not exceed 0.5 PSI (13.8 inches water column). If needed, your unit can withstand a differential of up to 4.6 PSI (127 inches water column).

Never ship an enclosure with your unit mounted inside. This may seriously damage the equipment. Units should be shipped in their original packing material, then mounted in an enclosure when it reaches its final destination.

A table has been developed to help in your selection of a free-standing enclosure. It is based on the following assumptions:

Assumptions

- 14 or 16 gauge cold rolled steel enclosure
- 11 watts dissipated by the unit
- no additional methods of cooling
- the enclosure having all sides uninsulated
- at least 2-inches between the unit and the top and bottom of the enclosure

From this table, you can predict how much the internal temperature will rise with different size enclosures.

This table is offered to you as an aid in the selection of enclosures to be used with our product. Cutler-Hammer offers no guarantee or warranty to the specific applicability of this table as actual conditions may vary and methods of the use of our product are beyond our control. The ultimate responsibility for the product's conformance to published specifications lies with you, the customer. For specific information about enclosure selection and cooling methods, contact your enclosure vendor.

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Enclosure Size vs Internal Temperature Rise	
Standard Enclosure Size (Inches)	Internal Temperature Rise*
10x12x4	9.2°C
10x12x5	8.3°C
12x12x4	7.9°C
12x12x5	7.0°C

*Accurate to within 1/2°C assuming the PanelMate unit is the only equipment mounted in the enclosure.

Table B-1 Heat Output Specification

Environmental Considerations

Cutler-Hammer equipment is designed and tested to operate over a wide temperature range. Temperatures outside this range can severely shorten the life of your system. High humidity, vibration, shock, or altitude can also adversely affect your system's operation and lifespan.

Locate your system as far as possible from transformers, relays, motor starters, and power or high-voltage (Type A) wiring. Maintain at least ten feet between your system and this type of equipment. This equipment generates interference which can induce noise in electrical wiring. Line power provided to any electronic equipment should be relatively free of voltage drifts, spikes, and drop-outs. Spike suppressers, uninterruptable power supplies and other devices can be used to condition line voltage. Line frequency to AC to DC converters used to power the PanelMate unit should also be maintained within noted tolerances. All equipment should be properly grounded at a ground run separate from that used by high-power devices such as motor starters and arc welders.

Cutler-Hammer cannot advise nor accept liability regarding placement of our equipment in hazardous environments. If this is a requirement in your application, contact a vendor experienced in placing electronic equipment in hazardous environments.

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Wiring Considerations

Another important concern should be the proper installation of wiring or cabling for your unit. When planning the location and placement of wiring, make sure that high-power lines are not in close proximity to low-level signal or communication cables. High-power conductors (Type A) include AC power lines and high power AC or DC I/O lines, such as those which connect to hard-contact switches, relays, solenoids, motors, generators and arc welders. These generate a large amount of electrical noise which can interfere with the operation of your equipment.

Low-signal-level conductors (Type B) include those carrying serial communication and local area networks such as Ethernet and PLC networks. These have a low tolerance for induced electrical noise. All low-level wiring should be shielded and routed in a separate conduit or raceway from high-power wiring. All raceways and conduit must be properly grounded.

Route low-level conductors at least one foot from 120V AC power lines, two feet from 240V AC power lines, and three feet from 480V AC power lines. If a low-level conductor must cross high power lines, it should do so at a right angle.

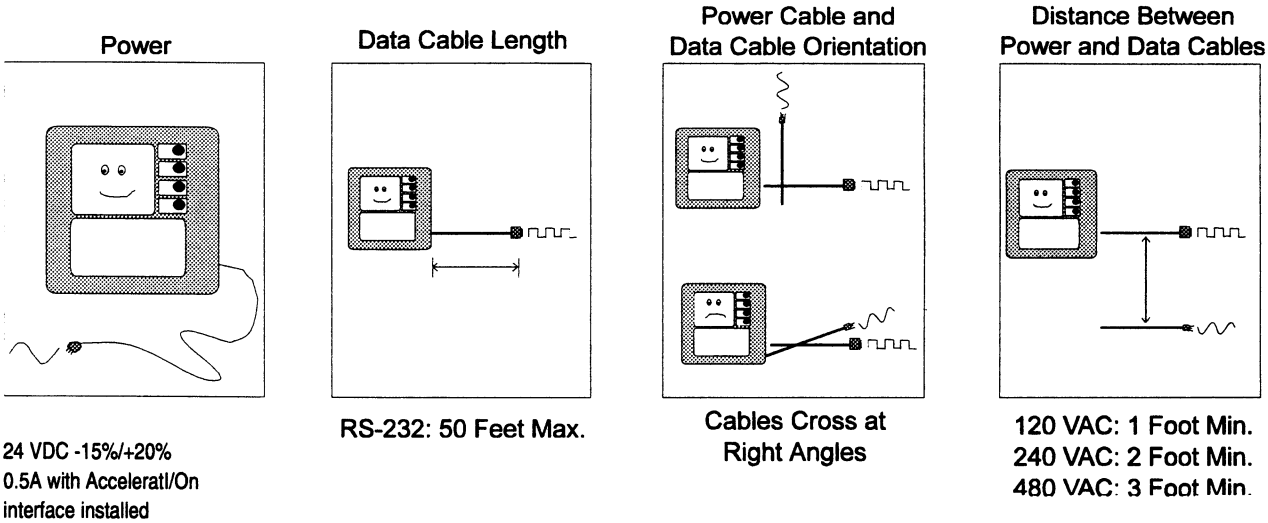


Figure B-1 Power and Wiring Specifications

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Most RS232 serial communication cables should be limited to 50 feet in length. Some devices or high-noise environments may limit usable cable lengths to less than 50 feet. Longer lengths are generally possible if the total cable capacitance does not exceed 2500 picofarads.

The effects of electrical noise can be reduced by using shielded cables with twisted-pair conductors. This method uses one conductor of a twisted pair for the transmit data line and a second twisted pair for the receive data line. The second conductor (guard conductor) of each twisted pair is connected to signal ground at the receive end and left unconnected at the transmit end. Signal ground can be run by paralleling two conductors of a third twisted pair and using them as the single conductor ground return. If higher noise immunity and longer distances are required, RS422 or 20 mA current loop schemes should be used.

All cable shields should be connected at both ends. To achieve maximum immunity to high frequency noise, such as that produced by electrostatic discharge, the shield must be directly connected to the PanelMate enclosure at the cable entry point. A well shielded connector consisting of a metal shell cover is the best choice. Never connect the shield to signal ground. Always connect it to the metal shield housing of the cable connector. When assembling cables, be sure the shield contacts the metal connector housing cable entry hole uniformly around its entire 360Y periphery. This is important because high frequency noise currents flow on surfaces. Discontinuities in the shield surface will resist and divert noise current along paths which may interfere with data signals.

If there is a significant AC or DC voltage difference (1 to 2 volts) between the power grounds of the PanelMate unit and a device to which it must be connected, then some type of electrical isolation (optical, fiber optical, or transformer) may be required.

Follow manufacturer's instruction for installation in local area networks and other communication cabling. High frequency communication often requires special cable and precautions to guard against signal reflections. External high-frequency disturbances near long cable runs may necessitate grounding cable shields at multiple points along the run.

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