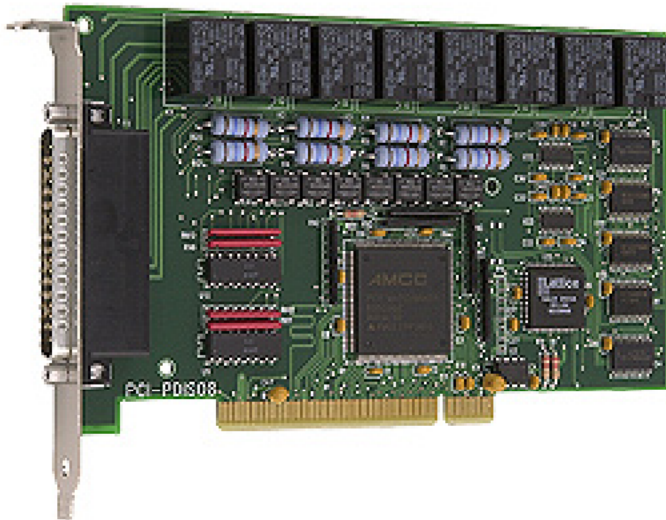


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# User's Guide

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## **PCI-PDISO8** **Isolated Input and Relay Output Interface**



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## About this User's Guide

### What you will learn from this user's guide

This user's guide explains how to install, configure, and use the PCI-PDISO8 so that you get the most out of its digital input and relay output features.

This user's guide also refers you to related documents available on our web site, and to technical support resources.

### Conventions in this user's guide

**For more information on ...**

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

**Caution!** Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

<#:#> Angle brackets that enclose numbers separated by a colon signify a range of numbers, such as those assigned to registers, bit settings, etc.

**bold text** **Bold** text is used for the names of objects on the screen, such as buttons, text boxes, and check boxes. For example:

1. Insert the disk or CD and click the **OK** button.

*italic text* *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase. For example:

The *InstaCal* installation procedure is explained in the *Quick Start Guide*.  
Never touch the exposed pins or circuit connections on the board.

---

# Introducing the PCI-PDISO8

## Overview: PCI-PDISO8 features

The PCI-PDISO8 is an eight channel-isolated high voltage digital input and eight relay output interface board. You can use the PCI-PDISO8 for control and sensing applications where high voltages need to be sensed or controlled.

**Caution!** High voltages are present on the PCI-PDISO8 board when you connect high voltage inputs or outputs to the PCI-PDISO8 connector. Use extreme caution! Never handle the PCI-PDISO8 when signals are connected to the board through the connector. Never remove the protective plates from the PCI-PDISO8.

The eight inputs are individual, optically-isolated (500 V) inputs that can be read back as a single byte. The inputs are not polarity sensitive and may be driven by either AC (50 - 1000 Hz) or DC. Each input channel has a programmable low-pass filter with a time constant of 5 ms (200 Hz).

The eight outputs are electromechanical relays. Five relays provide Form C connections, and three relays provide normally-open Form A connections. The relays are controlled by writing to an eight-bit port. The relay control register can be read back from the same port.

### Signal conditioning installed

The PCI-PDISO8 is a combination digital I/O board with signal conditioning installed. Most accessory boards provide signal conditioning or easy-to-access signal termination. The PCI-PDISO8 does not require additional signal conditioning.

## Software features

For information on the features of *InstaCal* and the other software included with your PCI-PDISO8, refer to the *Quick Start Guide* that shipped with your device.

PCI-PDISO8 functions are illustrated in the block diagram shown here.

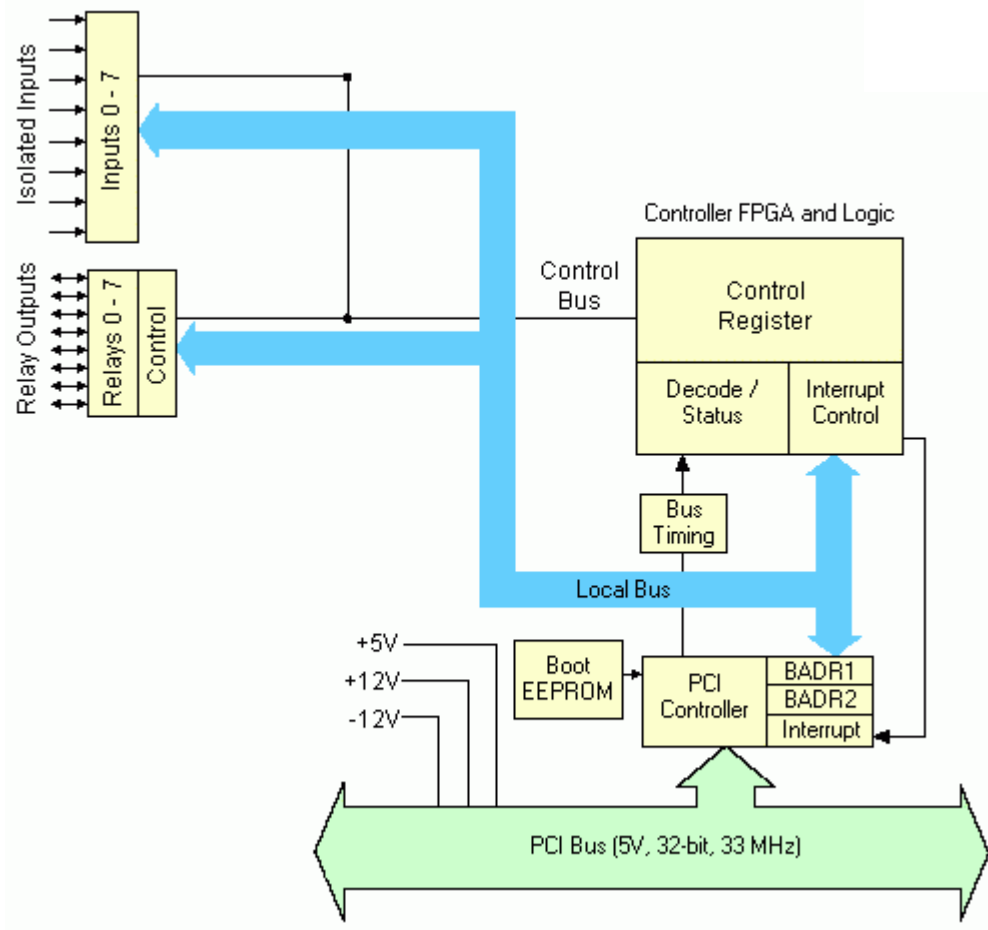


Figure 1-1. PCI-PDISO8 block diagram

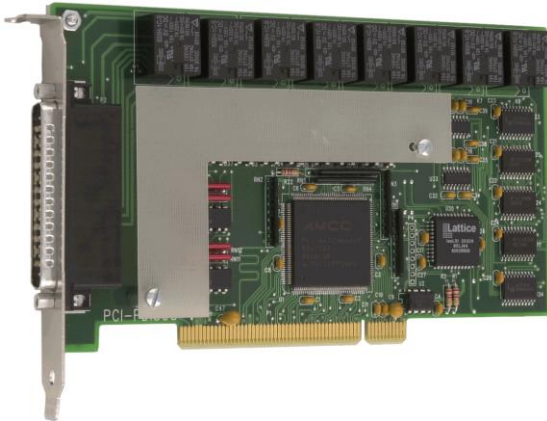
# Installing the PCI-PDISO8

## What comes with your PCI-PDISO8 shipment?

The following items are shipped with the PCI-PDISO8.

### Hardware

- PCI-PDISO8 board. The PCI-PDISO8 is shipped with a protective plate covering some components.



PCI-PDISO8 with protective plate



PCI-PDISO8 without protective plate

### Additional documentation

In addition to this hardware user's guide, you should also receive the *Quick Start Guide*. This booklet supplies a brief description of the software you received with your PCI-PDISO8 and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

### Optional components

- Cables



C37FFS-x



C37FF-x

- Signal termination and conditioning accessories

Omega provides signal termination products for use with the PCI-PDISO8. Refer to [Field wiring, signal termination and conditioning](#) on page 2-4 for a complete list of compatible accessory products.

## Unpacking the board

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the PCI-PDISO8 from its packaging, ground yourself using a wrist strap or by simply touching the computer chassis or other grounded object to eliminate any stored static charge.

If any components are missing or damaged, notify Omega immediately by phone, fax, or e-mail:

- Phone: (203) 359-1660
- Fax: (203) 359-7700
- Email: [info@omega.com](mailto:info@omega.com)

## Installing the software

Refer to the *Quick Start Guide* for instructions on installing the software on the *OmegaSoft DAQ Software CD*.

## Installing the hardware

The PCI-PDISO8 board is completely plug-and-play. There are no switches or jumpers to set on the board. Configuration is controlled by your system's BIOS. To install your board, follow the steps below.

### Install the OmegaSoft DAQ software before you install your board

The driver needed to run your board is installed with the OmegaSoft DAQ software. Therefore, you need to install the OmegaSoft DAQ software before you install your board. Refer to the *Quick Start Guide* for instructions on installing the software.

1. Turn your computer off, open it up, and insert your board into an available PCI slot.
2. Close your computer and turn it on.

If you are using an operating system with support for plug-and-play (such as Windows 2000 or Windows XP), a dialog box pops up as the system loads indicating that new hardware has been detected. If the information file for this board is not already loaded onto your PC, you will be prompted for the disk containing this file. The OmegaSoft DAQ software contains this file. If required, insert the CD and click **OK**.

3. To test your installation and configure your board, run the *InstaCal* utility installed in the previous section. Refer to the *Quick Start Guide* that came with your board for information on how to initially set up and load *InstaCal*.

## Connecting the board for I/O operations

### Connectors, cables – main I/O connector

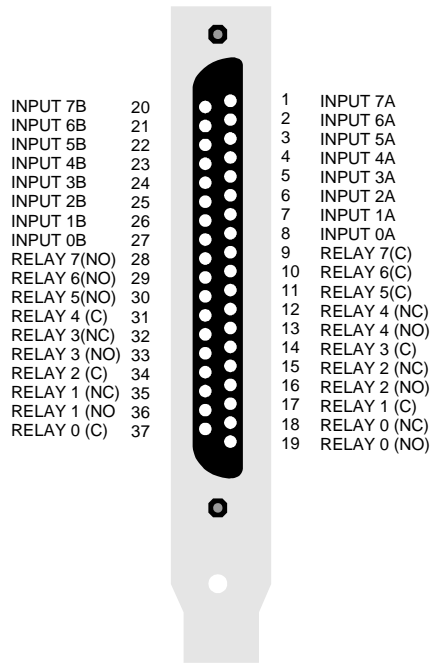
Table 2-1 lists the board connectors, applicable cables and compatible accessory boards.

Table 2-1. Board connectors, cables, accessory equipment

I/O connector type	37-pin D connector
Compatible cable	C37FF-x, where x = length in feet (Figure 2-2) C37FFS-x, where x =5 or 10 feet (Figure 2-3)
Compatible accessory products (with the C37FFS-x and C37FF-x cables)	CIO-MINI37 SCB-37



**Pin out – main I/O connector**



**37 PIN CONNECTOR - (NO) = Normally Open, (C) = Common, (NC) = Normally Closed.**

Figure 2-1. Main I/O connector pin out

**Caution!** High voltages are present on the PCI-PDISO8 when you connect high voltage inputs or outputs to the board's connector. Use extreme caution! Never handle the PCI-PDISO8 when signals are connected to the board through the connector.  
**Do not remove the protective plate from the PCI-PDISO8.**

**Cabling**

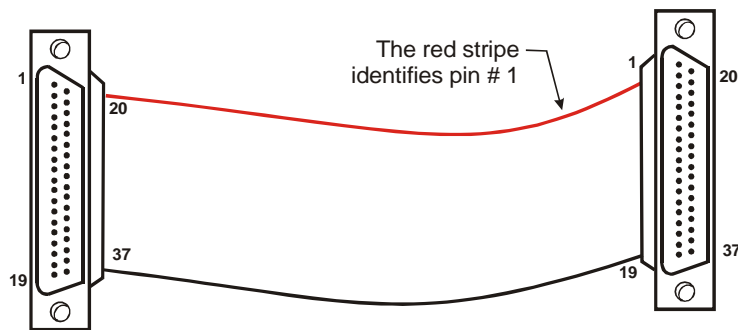


Figure 2-2. C37FF-x cable

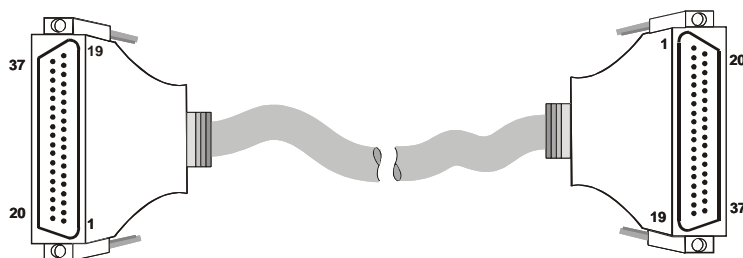


Figure 2-3. C37FFS-x cable

## Field wiring and signal termination accessories

You can connect the PCI-PDISO8 to the following accessory boards using the C37FF-x cable.

- CIO-MINI37 – 37-pin screw terminal board.

**Caution!** Do not use exposed-screw terminal boards if your field voltage is more than 24 volts. Using a screw terminal board with high voltage inputs or outputs exposes you and others to those high voltage signals. Construct a safe cable to carry your signals directly from your equipment to the PCI-PDISO8 connector.

## Functional Details

### Relay outputs

#### Form C relays

The Form C relay has a common, normally open (NO) and normally closed (NC) contact. Figure 3-1 shows the schematic for a Form C relay, like those connected at relay 0 through relay 4.

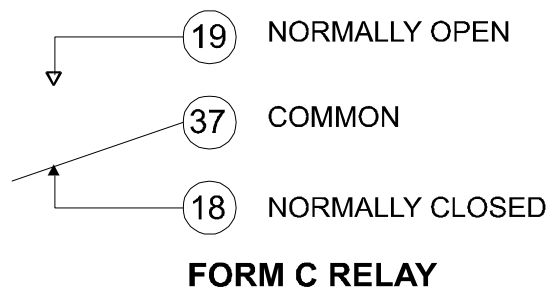


Figure 3-1. Form C Relay (0) contacts

- When 0 is written to the output, the common and NC are in contact.
- When 1 is written to the output, the common and NO are in contact.

#### Form A relays

The Form A relay has a common and a normally open (NO) contact. Figure 3-2 shows the schematic for a Form A relay, like those connected at relay 5 through relay 7.

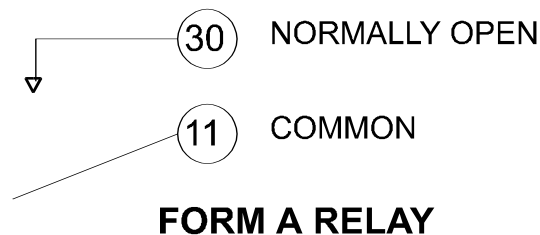


Figure 3-2. Form A Relay (5) contacts

- When 0 is written to the output, the common and NO are NOT in contact.
- When 1 is written to the output, the common and NO are in contact.

The Form A and Form C relays on the PCI-PDISO8 board are the same type. Only the connections to the relay poles differ.

## Isolated inputs

The PCI-PDISO8 has eight isolated input channels. A schematic of a single channel is shown in Figure 3-3. The signals are routed through a bridge rectifier so that the inputs are not polarity sensitive.

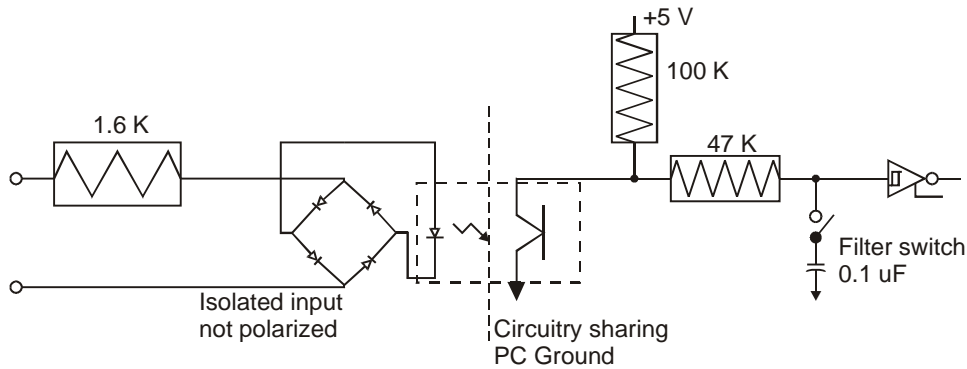
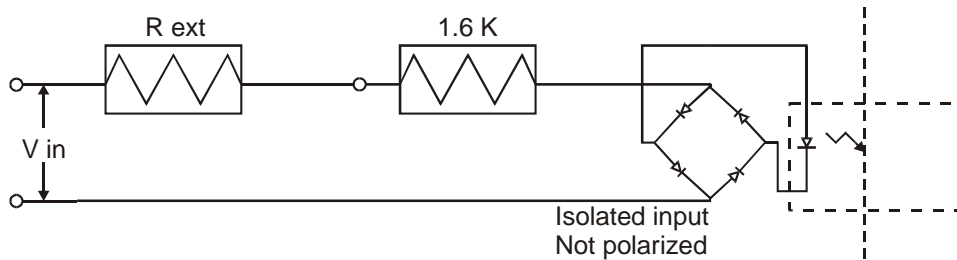


Figure 3-3. Isolated input schematic - simplified

## Extending the input range

To extend the input range beyond the 5-28V specified, add an external resistor. Figure 3-4 shows the resistor and the equations used to calculate resistor values for a given  $V_{in}$ .



$$R_{ext} = 100 * (V_{in} - 28)$$

$$P_w = R_{ext} / 10,000$$

Figure 3-4. Input range-extending resistor

## AC input filter

The inputs are eight individual, optically isolated (500 V) inputs that can be read back as a single byte. The inputs are not polarity sensitive and may be driven by either AC (50 - 1000 Hz) or DC.

Each input has a software enabled/disabled low-pass filter with a time constant of 5 ms (200 Hz). You enable or disable each input with *InstaCal*. The filter is required for AC inputs, and should be used for almost all DC inputs. Unless you have reason to turn off a filter, you should enable it

## Specifications

Typical for 25°C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

### Relay specifications

Table 1. Relay specifications

Number	8
Contact configuration	5 FORM C (SPDT) RELAY 0 through RELAY 4 3 FORM A (SPST) RELAY 5 through RELAY 7
Contact rating	6 A @ 120 VAC or 28 VDC resistive (see connector rating below)
Contact resistance	100 milliohms max
Operate time	20 milliseconds max
Release time	10 milliseconds max
Vibration	10 to 55 Hz (Dual amplitude 1.5 mm)
Shock	10 G (11 milliseconds)
Dielectric isolation	500 V (1 minute)
Life expectancy	10 million mechanical operations, min
Power on RESET state	Not energized. NC in contact to Common.

### Isolated inputs

Table 2. Isolated input specifications

Number	8
Isolation	500 V
Resistance	1.6 k Ohms min.
Voltage range	DC: 5 to 28 V (Not TTL compatible) AC: 5 to 28 V (50 to 1000 Hz)
Input 'High' level	>5V min (positive or negative input voltage - not TTL compatible)
Input 'Low' level	<2.5V max (positive or negative input voltage)
Response	w/o filter: 20 $\mu$ S w/filter: 5 mS
Filters	Time constant: 5 mS (200 Hz) Filter control: Software programmable at each input Power-up /reset: Filters off

### Power consumption

Table 3. Power consumption specifications

+5 V Power	All relays off: 0.4 A typical
	All relays on: 1 A typical

## Environmental

Table 4. Environmental specifications

Operating temperature range	0 to 70 °C
Storage temperature range	-40 to 100 °C
Humidity	0 to 90% non-condensing

## Main connector and pin out

Table 5. Main connector specifications

I/O connector type	37-pin D connector
Compatible cable	C37FF-x, where x = length in feet C37FFS-x, where x =5 or 10 feet
Compatible accessory products (with the C37FFS-x and C37FF-x cables)	CIO-MINI37 SCB-37
Max current	5 A

Table 6. Connector pin out

Pin	Signal Name	Pin	Signal Name
1	Input 7A	20	Input 7B
2	Input 6A	21	Input 6B
3	Input 5A	22	Input 5B
4	Input 4A	23	Input 4B
5	Input 3A	24	Input 3B
6	Input 2A	25	Input 2B
7	Input 1A	26	Input 1B
8	Input 0A	27	Input 0B
9	Relay 7 (C)	28	Relay 7 (NO)
10	Relay 6 (C)	29	Relay 6 (NO)
11	Relay 5 (C)	30	Relay 5 (NO)
12	Relay 4 (NC)	31	Relay 4 (C)
13	Relay 4 (NO)	32	Relay 3 (NC)
14	Relay 3 (C)	33	Relay 3 (NO)
15	Relay 2 (NC)	34	Relay 2 (C)
16	Relay 2 (NO)	35	Relay 1 (NC)
17	Relay 1 (C)	36	Relay 1 (NO)
18	Relay 0 (NC)	37	Relay 0 (C)
19	Relay 0 (NO)		

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