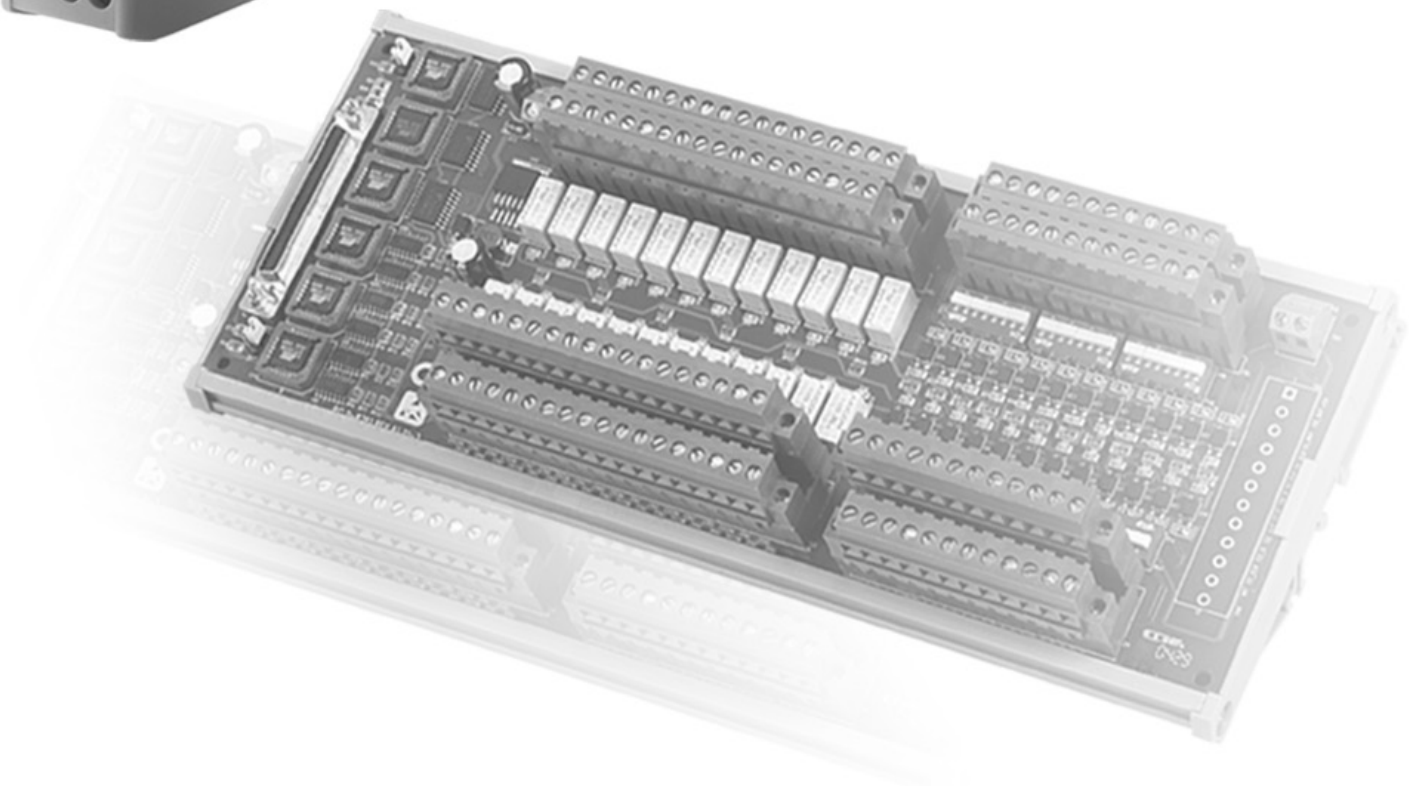
# 10

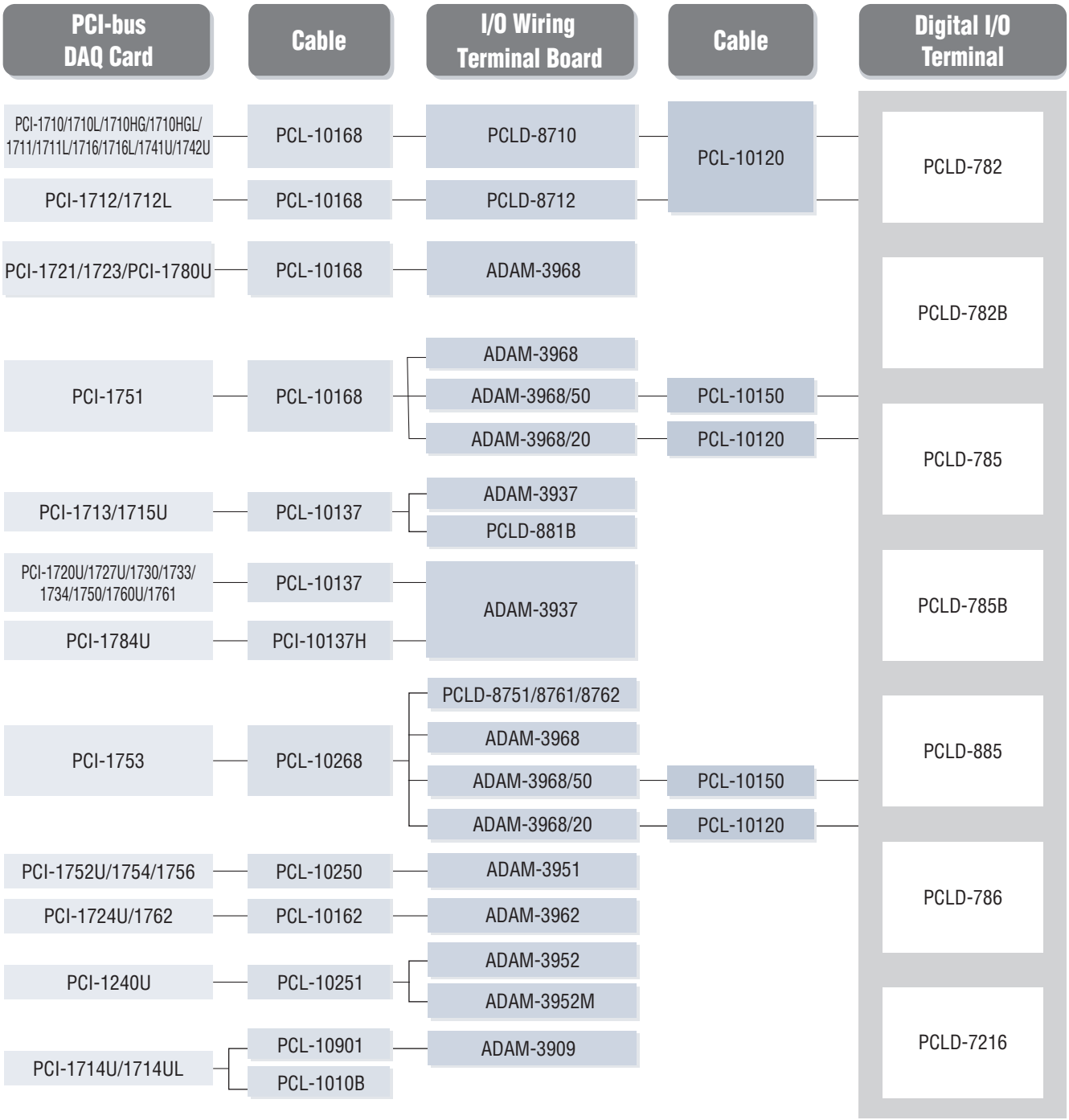
# Signal Conditioning Modules and Terminal Boards



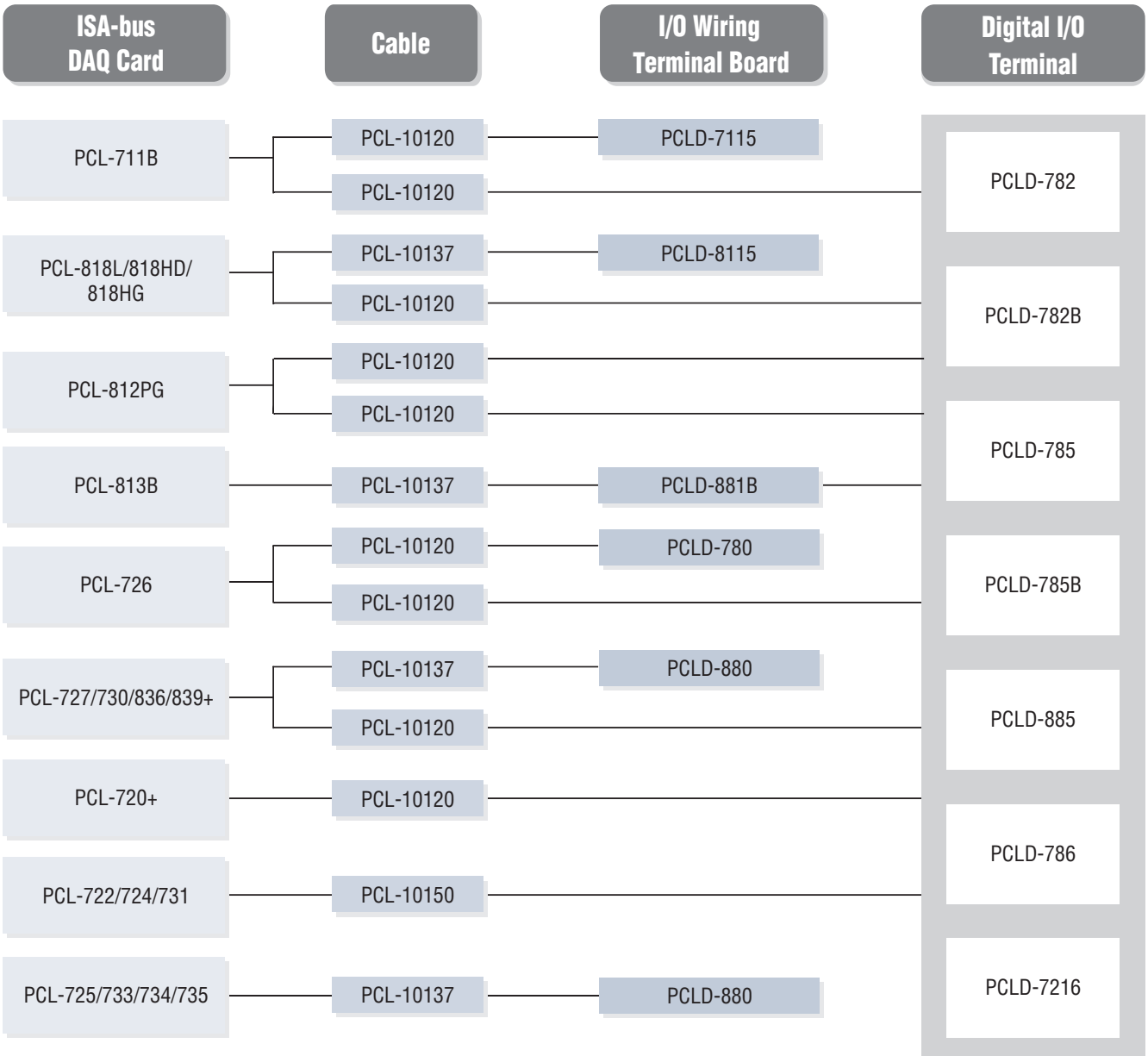



# Terminal Board Selection Guide

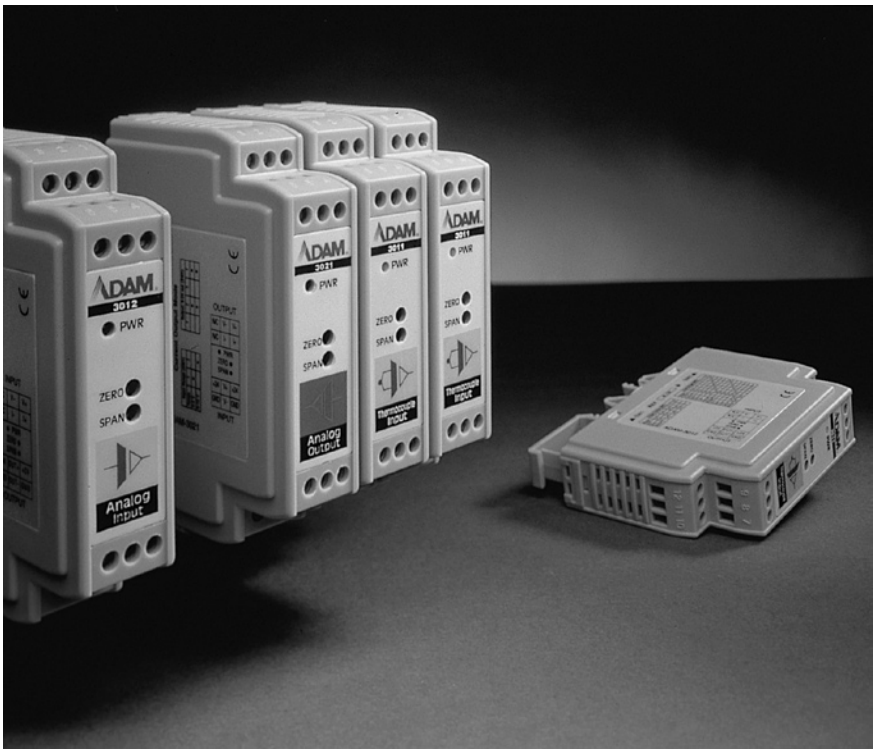
## Recommended Cables, I/O Wiring Terminal Boards and Isolated Digital I/O Terminals for Connecting to PCI-bus Data Acquisition (DAQ) Cards



# Recommended Cables, I/O Wiring Terminal Boards and Isolated Digital I/O Terminals for Connecting to ISA-bus Data Acquisition (DAQ) Cards



# ADAM-3000 Series




## Features

- 1,000 $V_{DC}$ three-way isolation
- Easy input/output range configuration
- Flexible DIN-rail mounting
- Linearized thermocouple/RTD measurement
- Low power consumption
- Wide input bandwidth

## Introduction

The ADAM-3000 Series consist of the most cost-efficient, field configurable, isolation-based, signal conditioners on the market today. The modules are easily installed to protect your instruments and process signals from the harmful effects of ground loops, motor noise, and other electrical interferences.

### Affordable Signal Isolation Solution

Featuring optical isolation technology, the ADAM-3000 modules provide three-way (input/output/power) 1,000 $V_{DC}$ isolation. Optical isolation provides pin-point accuracy and stability over a wide range of operations at minimal power consumption.

### Flexible Analog Data Conversion

The input/output range for the ADAM-3000 modules can be configured through switches located inside the module. The modules accept voltage, current, thermocouple or RTD as input, and pass voltage or current as output.

Thermocouple input is handled by the built-in input thermocouple linearization circuitry and a cold junction compensation function. These ensure accurate temperature measurement and accurate conversion of this information to the voltage or current output.

### Configuration

The ADAM-3000 modules use +24 $V_{DC}$ power. This electrical power wiring can be acquired from adjacent modules, which greatly simplifies wiring and maintenance. The I/O configuration switches are located inside the modules. To reach the switches, simply remove the modules from the DIN-rail bracket by sliding the modules downward.

### Modular Industrial Design

The ADAM-3000 modules can be easily mounted on a DIN-rail, and signal wires can be connected through screw terminals. The screw terminals and input/output configuration switches are built inside the industrial grade plastic casing. With simple two-wire input/output cables, wiring is easy and reliable in harsh industrial environments.

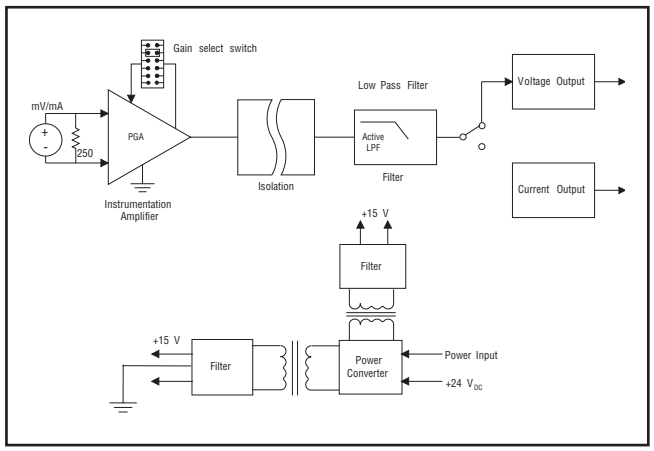
### Applications

- Signal isolation
- Signal transmitters
- Thermocouple/RTD/strain gauge measurements
- Signal amplifiers
- Noise filter

### Common Specifications

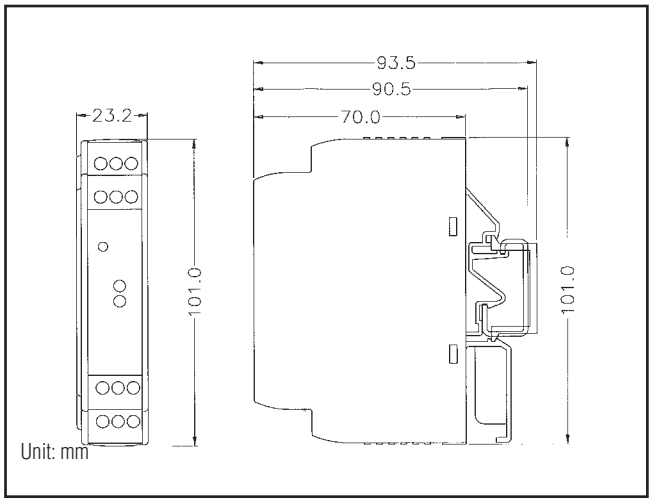
| | |
|---|---|
| **Isolation** | 1,000 $V_{DC}$ |
| **Indicators** | Power LED indicator |
| **Power Requirement** | +24 $V_{DC}$ ± 10% |
| **Case** | ABS |
| **Screw Terminal** | Accepts 0.5 $mm^2$ ~ 2.5 $mm^2$<br>1- #12 or 2- #14 ~ #22 AWG |
| **Operating Temperature** | 0 ~ 70° C (32 ~ 158° F) (except ADAM-3011) |
| **Storage Temperature** | -25 ~ 85° C (-13 ~ 185° F) |

## Block Diagram

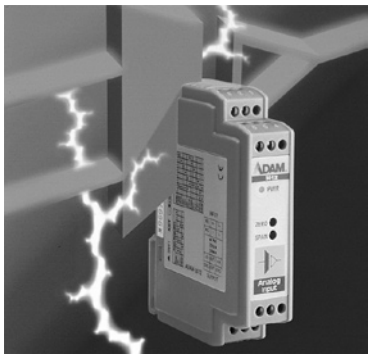



**Block Diagram of ADAM-3014**

## Dimensions

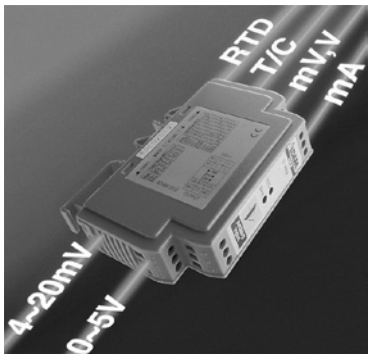



**ADAM-3000 Series Modules**



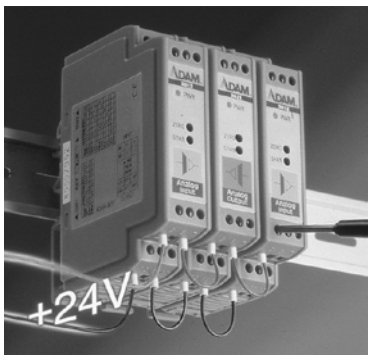
**Three-way Signal Isolation**

Three-way (input/output/power) 1,000 $V_{DC}$ isolation.



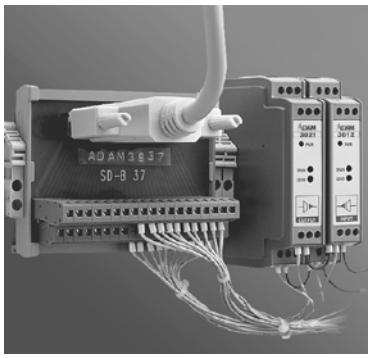

**Field Configurable I/O Range**

The I/O range can be configured on site with switches inside the module.




**Easy Daisy Chain Power Wiring**

Power can be connected conveniently from adjacent modules.



**Interfacing to DAQ Cards**

A wiring adapter can connect modules to a data acquisition card.

# ADAM-3011
# ADAM-3013
# ADAM-3014

## Isolated Thermocouple Input Module

## Isolated RTD Input Module

## Isolated DC Input/Output Module

ADAM-3011

ADAM-3013

ADAM-3014

## Specifications

### Thermocouple Input

- **Common Mode Rejection** 115 dB min
- **Input Type**

| T/C type | Temperature Range (° C) | Accuracy at 25° C (° C) |
|---|---|---|
| J | -40 ~ 760 | ±2 |
| K | 0 ~ 1,000 | ±2 |
| T | -100 ~ 400 | ±2 |
| E | 0 ~ 1,000 | ±2 |
| S | 500 ~ 1,750 | ±4 |
| R | 500 ~ 1,750 | ±4 |
| B | 500 ~ 1,800 | ±4 |

- **Isolation (Three-way)** 1,000 $V_{DC}$
- **Output Impedance** 0.5 Ω
- **Stability (Temperature Drift)** ±2° C
- **Voltage Output** 0 ~ 10 V

### General

- **Certifications** CE, FM
- **Connectors** Screw terminal
- **Enclosure** ABS
- **Indicators** Power LED indicator
- **Isolation** 1,000 $V_{DC}$
- **Power Consumption** 1.4 W
- **Power Input** +24 $V_{DC}$ ± 10%
- **Operating Temperature** 0 ~ 50° C (32 ~ 122° F)
- **Storage Temperature** -25 ~ 85° C (-13 ~ 185° F)

## Ordering Information

- **ADAM-3011** Isolated Thermocouple Input Module



## Specifications

### RTD Input

- **Accuracy** ± 0.1% of full range (voltage) or +/- 0.15° C (voltage)
  ± 0.2% of full range (current)
- **Bandwidth** 4 Hz
- **Input CMR at DC** 92 dB min.
- **Input Connections** 2, 3 or 4 wires
- **Input Type**

| RTD type | α | Temperature Range (° C) |
|---|---|---|
| Pt | 0.00385 | -100 ~ 100 |
| Pt | 0.00385 | 0 ~ 100 |
| Pt | 0.00385 | 0 ~ 200 |
| Pt | 0.00385 | 0 ~ 600 |
| Pt | 0.00385 | -100 ~ 0 |
| Pt | 0.00385 | -100 ~ 200 |
| Pt | 0.00385 | -50 ~ 50 |
| Pt | 0.00385 | -50 ~ 150 |
| Pt | 0.00392 | -100 ~ 100 |
| Pt | 0.00392 | 0 ~ 100 |
| Pt | 0.00392 | 0 ~ 200 |
| Pt | 0.00392 | 0 ~ 600 |
| Ni | N/A | 0 ~ 100 |
| Ni | N/A | -80 ~ 100 |

- **Output Range** 0 ~ 5 V, 0 ~ 10 V, 0 ~ 20 mA
- **Output Resistance** < 5 Ω
- **Temperature Drift** ± 30 ppm of full range

### General

- **Certifications** CE, FM
- **Connectors** Screw terminal
- **Enclosure** ABS
- **Indicators** Power LED indicator
- **Isolation** 1,000 $V_{DC}$
- **Power Consumption** < 0.95 W
- **Power Input** 24 $V_{DC}$ ±10%
- **Operating Temperature** 0 ~ 70° C (32 ~ 158° F)
- **Storage Temperature** -25 ~ 85° C (-13 ~ 185° F)

## Ordering Information

- **ADAM-3013** Isolated RTD Input Module

## Specifications

### I/O

- **Accuracy** ±0.1% of full range (typical)
- **Common Mode Rejection** > 100 dB @ 50 Hz/60 Hz
- **Current Input** Bipolar: ±20 mA
  Unipolar: 0 ~ 20 mA
  Input impedance: 250 Ω
- **Current Output** 0 ~ 20 mA
- **Stability (Temperature Drift)** 150 ppm (typical)
- **Voltage Input** Bipolar input:
  ±10 mV, ±50 mV, ±100 mV, ±0.5 V, ±1.0 V, ±5 V, ±10 V
  Unipolar input:
  0 ~ 10 mV, 0 ~ 50 mV, 0 ~ 100 mV, 0 ~ 0.5 V, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10 V
  Input impedance: 2 MΩ
  Input bandwidth: 2.4 kHz (typical)
- **Voltage Output** Bipolar: ±5 V, ±10 V
  Unipolar: 0 ~ 10 V
  Impedance: < 50 Ω
  Drive: 10 mA max.

### General

- **Certifications** CE, FM
- **Connectors** Screw terminal
- **Enclosure** ABS
- **Indicators** Power LED indicator
- **Isolation (Three-way)** 1,000 $V_{DC}$
- **Power Consumption** 0.85 W (voltage output)
  1.2 W (current output)
- **Power Input** 24 $V_{DC}$ ±10%
- **Operating Temperature** -10 ~ 70° C (14 ~ 158° F)
- **Storage Temperature** -25 ~ 85° C (-13 ~ 185° F)

## Ordering Information

- **ADAM-3014** Isolated DC Input/Output Module

# ADAM-3016
# ADAM-3112
# ADAM-3114

## Isolated Strain Gauge Input Module

## Isolated AC Voltage Input Module

## Isolated AC Current Input Module

ADAM-3016


ADAM-3112


ADAM-3114

## Specifications

### I/O

- **Accuracy** ±0.1% of full range
- **Bandwidth** 2.4 kHz (typical)
- **Isolation Mode Rejection** >100 dB @ 50 Hz/60 Hz
- **Current Output** Current: 0 ~ 20 mA
  Current load resistor: 0 ~ 500 Ω (Source)
- **Stability (Temperature Drift)** 150 ppm (typical)
- **Voltage Specifications** Electrical input: ±10 mV, ±20 mV, ±30 mV, ±100 mV
  Excitation voltage: 1 ~ 10 $V_{DC}$ (60 mA max)
- **Voltage Output** Bipolar: ±5 V, ±10 V
  Unipolar: 0 ~ 10 V
  Impedance: < 50 Ω

### General

- **Certifications** CE
- **Connectors** Screw terminal
- **Enclosure** ABS
- **Indicators** Power LED indicator
- **Isolation (Three-way)** 1,000 $V_{DC}$
- **Power Consumption** ≤ 1.85 W (voltage output)
  ≤ 2.15 W (current output)
- **Power Input** 24 $V_{DC}$ ±10%
- **Operating Temperature** -10 ~ 70° C (14 ~ 158° F)
- **Storage Temperature** -25 ~ 85° C (-13 ~ 185° F)

## Ordering Information

- **ADAM-3016** Isolated Strain Gauge Input Module

## Specifications

### Voltage Input

| Full Range Mode | | 400 V | 250 V | 120 V |
|---|---|---|---|---|
| Input Voltage | AC ($V_{RMS}$) | 0 ~ 400 | 0 ~ 250 | 0 ~ 120 |
| | DC (V) | 0 ~ 400 | 0 ~ 250 | 0 ~ 120 |
| Input Impedance | | 48 k | 30 k | 14.4 k |

### Voltage Output

- **Output Signal** 0 ~ +5 $V_{DC}$
- **Accuracy** < ±1.0 % for full range
- **Output Impedance** < 10 Ω @ operating frequency <60 Hz
- **Load** > 10 k Ω
- **Ripple** < 120mVp-p
- **Temperature Coefficient** 400 ppm/° C
- **Input Bandwidth** 6 kHz

### Power Consumption

- **Supply Voltage** +24 $V_{DC}$ ± 10 %
- **Current Consumption** 40 mA

### General

- **Isolation Protection** 1,000 $V_{DC}$ (output to power)
  2,500 $V_{RMS}$ (input to output, input to power)
- **Operating Temperature** 0 ~ 60° C
- **Storage Temperature** -20 ~ 70° C
- **Storage Humidity** 5 ~ 95 %

## Ordering Information

- **ADAM-3112** Isolated AC Voltage Input Module

## Specifications

### Current Input

- **AC Current Input** 0 ~ 5 $A_{RMS}$
- **DC Current Input** 0 ~ 5 A

### Voltage Output

- **Output Signal** 0 ~ +5 $V_{DC}$
- **Accuracy** < ±1.0 % for full range
- **Output Impedance** <10 Ω @ operating frequency <60 Hz
- **Load** > 10 k Ω
- **Ripple** < 120 mVp-p
- **Temperature Coefficient** 400 ppm/° C
- **Input Bandwidth** 10 kHz

### Power Consumption

- **Supply Voltage** +24 $V_{DC}$ ± 10 %
- **Current Consumption** 40 mA

### General

- **Isolation Protection** 1,000 $V_{DC}$ (output to power)
  2,500 $V_{RMS}$ (input to output, input to power)
- **Operating Temperature** 0 ~ 60° C
- **Storage Temperature** -20 ~ 70° C
- **Storage Humidity** 5 ~ 95 %

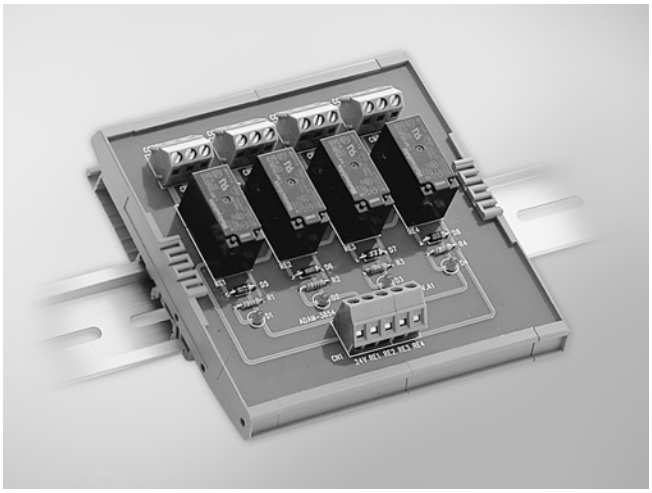
## Ordering Information

- **ADAM-3114** Isolated AC Current Input Module

# ADAM-3854
# ADAM-3864

## 4-ch Power Relay Module

## 4-ch Solid State Digital I/O Module Carrier Backplane



ADAM-3854

## Features

- High power relays can handle up to 5 A @ 250 $V_{AC}$ and 5 A @ 30 $V_{DC}$
- 4 single-pole double-throw (SPDT) relays
- Industrial screw terminals for easy output wiring
- LED status indicators
- Onboard varistor protects relay contact points
- DIN-rail mounting

## Specifications

### I/O

- **Channels** 4
- **Contact Rating** AC: 250 V @ 5 A
  DC: 30 V @ 5 A
- **Contact Resistance** 100 mΩ
- **Operation Time** 15 ms max.
- **Relay Type** SPDT (Form C)
- **Release Time** 5 ms max.
- **Life Expectancy** 1.7 x 105 at rated load

### Varistor

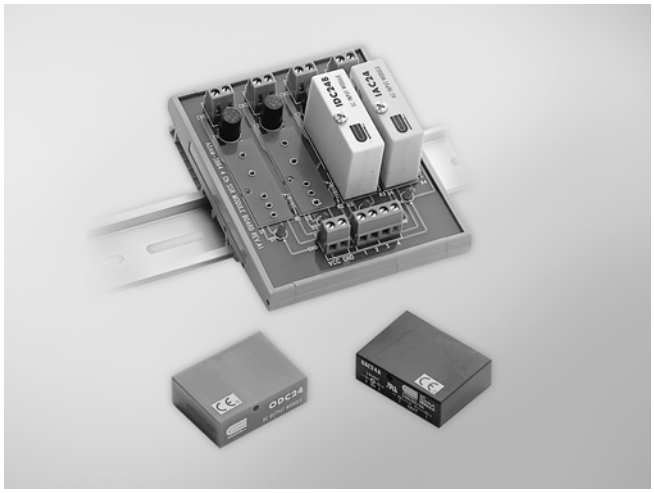
- **Clamping Voltage** 760 V (10 A)
- **Max. Applied Voltage** 300 $V_{RMS}$
- **Max. Peak Current** 1,200 A for 8 ms
- **Varistor Voltage** 470 V (current = 1 mA)

### General

- **Connectors** Screw terminals
- **Dimensions (L x W x H)** 112.5 x 118.4 x 46 mm (4.43" x 4.66" x 1.81")
- **LED Indicators** Status displayed for each relay
- **Mounting** DIN-rail
- **Power Consumption** 2.2 W
- **Power Input** +24 $V_{DC}$

## Ordering Information

- **ADAM-3854** 4-ch DIN-rail Power Relay Module



ADAM-3864



## Features

- 2,500 $V_{RMS}$ optical isolation
- LED status indicators
- Onboard fuse protection
- DIN-rail mounting

## Specifications

### Input Modules

**Field Side:**

- **Input On/Off Voltage Range** IAC24A series: 180 ~ 280 V/80 $V_{RMS}$
  IDC24B series: 3 ~ 32 V/1 $V_{DC}$
- **Input Resistance** IAC24A series: 44 kΩ
  IDC24B series: 1.5 kΩ

**Logic Side:**

- **Breakdown Voltage** 30 $V_{DC}$
- **Output Current** 100 mA max.
- **Output Voltage Drop** 0.4 V max.
- **Supply Current** 12 mA max.
- **Supply Voltage** 24 $V_{DC}$

### Output Modules

**Field Side:**

- **Contact Voltage Drop** 1.6 V max.
- **Current Rating** 3 A max. (@ 25° C)

**Logic Side:**

- **Input Resistance** 220 Ω
- **Supply Current** 12 mA max.
- **Supply Voltage** 24 V

### General

- **Dimensions (L x H x W)** 118.4 x 90 x 59 mm (4.66" x 3.54" x 2.32")
- **Mounting** DIN-rail

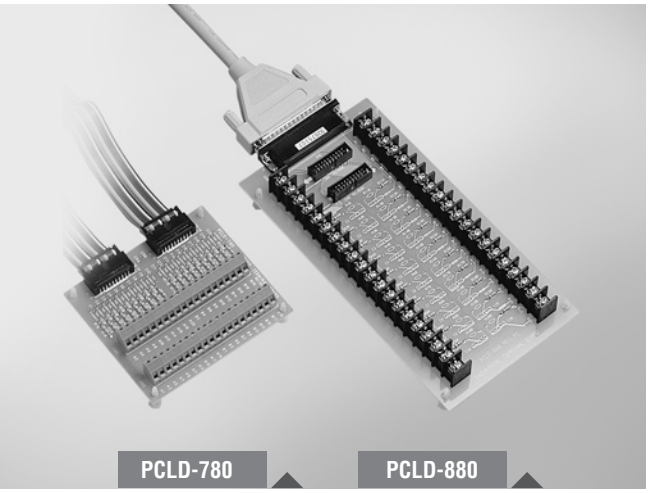
## Ordering Information

- **ADAM-3864** 4-ch Solid State Module Carrier Backplane
- **OAC24A** AC Output Module (24-280 $V_{AC}$, 3 A)
- **ODC24** DC Output Module (5-60 $V_{DC}$, 3 A)
- **PCLM-ODC5** Single Piece DC SSR Module (60 $V_{DC}$, 3 A)
- **IAC24A** AC Input Module (180-280 $V_{AC}$)
- **IDC24B** DC Input Module (3-32 $V_{DC}$)

# PCLD-780
# PCLD-880

## Screw Terminal Board with Flat Cables

## Wiring Terminal Board with Flat Cables and Adapter




## Features

- Pin to pin design
- Low-cost universal screw-terminal boards for industrial applications
- 40 terminal points for two 20-pin flat cable connector ports
- Reserved space for signal-conditioning circuits such as low-pass filter, voltage attenuator and current-to-voltage conversion
- Table-top mounting using nylon standoffs. Screws and washers provided for panel or wall mounting

**PCLD-780 Only**

- Screw-clamp terminal-blocks allow easy and reliable connections
- Dimensions: 102 x 114 mm (4.0" x 4.5")

**PCLD-880 Only**

- Supports PC-LabCard™ products with DB37 connectors
- Industrial-grade terminal blocks (barrier-strip) permit heavy-duty and reliable connections
- Dimensions: 221 x 115 mm (8.7" x 4.5")

## Introduction

PCLD-780 and PCLD-880 universal screw-terminal boards provide convenient and reliable signal wiring for PC-LabCard™ products with 20-pin flat-cable connectors. PCLD-880 is also equipped with a DB37 connector to support PC-LabCard™ products with DB37 connectors.

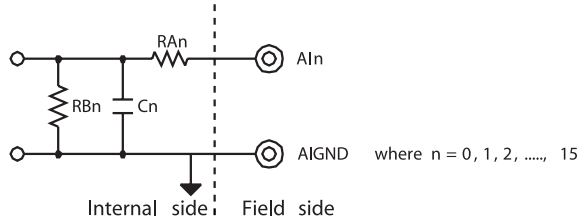
PCLD-780 and PCLD-880 let you install passive components on the special PCB layout to construct your own signal-conditioning circuits. You can easily construct a low-pass filter, attenuator or current-to-voltage converter by adding resistors and capacitors onto the board's circuit pads.

## Applications

- Field wiring for analog and digital I/O channels of PC-LabCard™ products which employ the standard 20-pin flat cable connectors or DB37 connectors (only PCLD-880)
- Signal conditioning circuits can be implemented as illustrated in the following examples:

**a) Straight-through connection (factory setting)**

RAn = 0Ω jumper




RBn = none

Cn = none

**b) 1.6 kHz (3dB) low pass filter**

*RAn = 10 KΩ*

*RBn = none*

*Cn = 0.01μF*

$$f_{3dB} = \frac{1}{2\pi RAnCn}$$

**c) 10 : 1 voltage attenuator**

RAn = 9 KΩ

RBn = 1 KΩ

Cn = none

$$\text{Attenuation} = \frac{RBn}{RAn + RBn}$$

(Assume source impedance << 10 KΩ)

**d) 4 ~ 20 mA to 1 ~ 5 $V_{DC}$ signal converter**

RAn = 0 Ω (short)

RBn = 250 Ω (0.1% precision resistor)

Cn = none

## Pin Assignments

CN1

| | | | |
|---|---|---|---|
| A1 | 1 | 2 | A2 |
| A3 | 3 | 4 | A4 |
| A5 | 5 | 6 | A6 |
| A7 | 7 | 8 | A8 |
| A9 | 9 | 10 | A10 |
| A11 | 11 | 12 | A12 |
| A13 | 13 | 14 | A14 |
| A15 | 15 | 16 | A16 |
| A17 | 17 | 18 | A18 |
| A19 | 19 | 20 | A20 |

CN2

| | | | |
|---|---|---|---|
| B1 | 1 | 2 | B2 |
| B3 | 3 | 4 | B4 |
| B5 | 5 | 6 | B6 |
| B7 | 7 | 8 | B8 |
| B9 | 9 | 10 | B10 |
| B11 | 11 | 12 | B12 |
| B13 | 13 | 14 | B14 |
| B15 | 15 | 16 | B16 |
| B17 | 17 | 18 | B18 |
| B19 | 19 | 20 | B20 |

CN5 (PCLD-880 only)

| | | | |
|---|---|---|---|
| A1 | 1 | 20 | A2 |
| A3 | 2 | 21 | A4 |
| A5 | 3 | 22 | A6 |
| A7 | 4 | 23 | A8 |
| A9 | 5 | 24 | A10 |
| A11 | 6 | 25 | A12 |
| A13 | 7 | 26 | A14 |
| A15 | 8 | 27 | A16 |
| A17 | 9 | 28 | A18 |
| A19 | 10 | 29 | A20 |
| B1 | 11 | 30 | B2 |
| B3 | 12 | 31 | B4 |
| B5 | 13 | 32 | B6 |
| B7 | 14 | 33 | B8 |
| B9 | 15 | 34 | B10 |
| B11 | 16 | 35 | B12 |
| B13 | 17 | 36 | B14 |
| B15 | 18 | 37 | B16 |
| B17 | 19 | | |

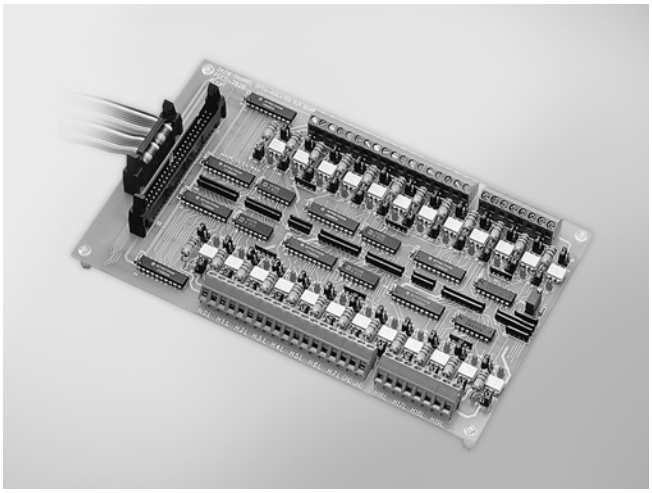
## Ordering Information

| | |
|---|---|
| **PCLD-780** | Screw Terminal Board w/ Two 20-pin Flat Cables |
| **PCLD-880** | Wiring Board w/ Two 20-pin Flat Cables & Adapter |
| **PCL-10137-1** | DB37 Cable, 1 m |
| **PCL-10137-2** | DB37 Cable, 2 m |
| **PCL-10137-3** | DB37 Cable, 3 m |
| **PCL-10120-1** | 20-pin Flat Cable, 1 m |
| **PCL-10120-2** | 20-pin Flat Cable, 2 m |

# PCLD-782
# PCLD-782B

## 16-ch Opto-Isolated Digital Input Board

## 24-ch Opto-Isolated Digital Input Board



CE

## Features

- Compatible with all PC-LabCard™ products with DI channels on either 20-pin flat cable or 50-pin Opto-22 compatible connectors
- 16 or 24 optically-isolated digital input channels
- Built-in screw terminals for easy input wiring
- LEDs indicate input logic status
- Inputs buffered with voltage comparators

## Introduction

PCLD-782 and PCLD-782B digital input daughterboards feature high-voltage (> 1,500 $V_{DC}$) optical isolation on all inputs. PCLD-782 provides 16 input channels accessible through one 20-pin flat cable connector, which is standard on most PC-LabCard™ products. The PCLD-782B provides either 16 or 24 channels, depending on what connector you use. The PCLD-782B's 20-pin connector lets you access 16 channels, similar to the PCLD-782, but also provides a 50-pin Opto-22 connector with access to 24 channels.

Both cards have onboard screw terminals for easy input wiring. Optically isolated signal conditioning provides isolation between separate channels, as well as between each input channel and the PC. This isolation prevents floating potential and ground loop problems while protecting the input lines from potentially damaging fault conditions.

## Specifications

### Isolated Digital Input

- **Input Channels** — PCLD-782: 16<br>PCLD-782B: 24
- **Input Range** — 0 ~ 24 $V_{DC}$
- **Input Resistance** — 560 W
- **Isolation Voltages** — 1,500 $V_{DC}$ min.
- **Threshold Voltage** — 1.5 $V_{DC}$ (VR adjustable)

### General

- **Certifications** — CE
- **Connectors**<br>Digital Input: Screw terminals (#12 ~ 22 AWG)<br>Controller: PCLD-782: 1 x 20-pin box header (CN1)<br>PCLD-782B: 1 x 20-pin box header (CN1) and 1 x 50-pin box header (CN2)
- **Dimensions (L x W)** — PCLD-782: 3U– 205 x 114 mm (8.1" x 4.5")<br>PCLD-782B: 4U– 220 x 132 mm (8.7" x 5.2")
- **LED Indicators** — Indicates input logic status
- **Mounting** — 4 x screw holes for flat surface mounting

## Ordering Information

- **PCLD-782** — 16-ch Isolated DI Board w/ 1m 20-pin Flat Cable
- **PCLD-782B** — 24-ch IDI Board w/ 20-pin & 50-pin Flat Cables
- **PCL-10120-1** — 20-pin Flat Cable, 1 m
- **PCL-10120-2** — 20-pin Flat Cable, 2 m
- **PCL-10150-1.2** — 50-pin Flat Cable, 1.2 m

## Pin Assignments

CN1

| | | | |
|---|---|---|---|
| DI0 | 1 | 2 | DI1 |
| DI2 | 3 | 4 | DI3 |
| DI4 | 5 | 6 | DI5 |
| DI6 | 7 | 8 | DI7 |
| DI8 | 9 | 10 | DI9 |
| DI10 | 11 | 12 | DI11 |
| DI12 | 13 | 14 | DI13 |
| DI14 | 15 | 16 | DI15 |
| GND | 17 | 18 | GND |
| +5 V | 19 | 20 | +12 V |

CN2

| | | | |
|---|---|---|---|
| DI23 | 1 | 2 | GND |
| DI22 | 3 | 4 | GND |
| DI21 | 5 | 6 | GND |
| DI20 | 7 | 8 | GND |
| DI19 | 9 | 10 | GND |
| DI18 | 11 | 12 | GND |
| DI17 | 13 | 14 | GND |
| DI16 | 15 | 16 | GND |
| DI15 | 17 | 18 | GND |
| DI14 | 19 | 20 | GND |
| DI13 | 21 | 22 | GND |
| DI12 | 23 | 24 | GND |
| DI11 | 25 | 26 | GND |
| DI10 | 27 | 28 | GND |
| DI9 | 29 | 30 | GND |
| DI8 | 31 | 32 | GND |
| DI7 | 33 | 34 | GND |
| DI6 | 35 | 36 | GND |
| DI5 | 37 | 38 | GND |
| DI4 | 39 | 40 | GND |
| DI3 | 41 | 42 | GND |
| DI2 | 43 | 44 | GND |
| DI1 | 45 | 46 | GND |
| DI0 | 47 | 48 | GND |
| +5 V | 49 | 50 | GND |

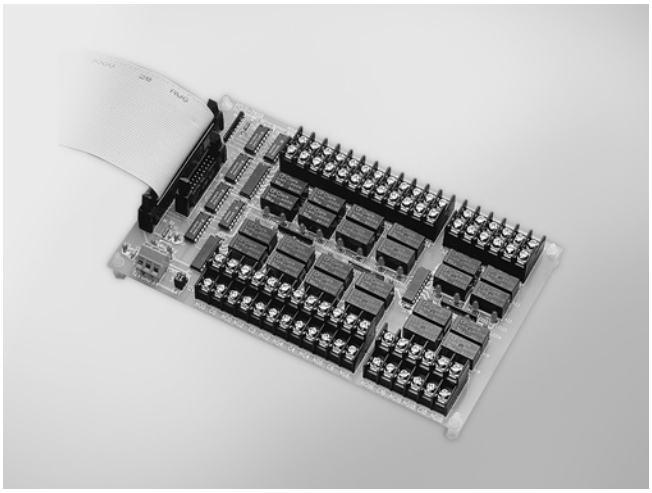
# PCLD-785
# PCLD-785B
# PCLD-885



## 16-ch Relay Board

## 24-ch Relay Board

## 16-ch Power Relay Board



PCLD-785/B

## Features

- Compatible with PC-LabCard™ products with 20-pin digital output connector and 50-pin Opto-22 digital output connector (PCLD-785B only)
- Automatic selection of control logic (PLCD-785B only): Negative logic for the Opto-22 connector Positive logic for the 20-pin flat cable connector
- Screw terminals for easy output wiring
- LED status indicators

## Specifications

### Relay

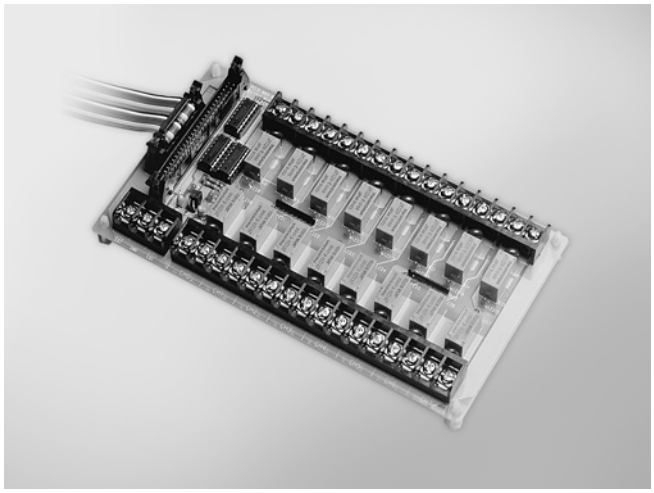
| | |
|---|---|
| **Channels** | PCLD-785: 16 (CN1, 20-pin conn.)<br>PCLD-785B: 16 (CN1, 20-pin conn.)<br>24 (CN2, 50-pin conn.) |
| **Contact Ratings** | 120 $V_{AC}$ @ 0.5 A, 30 $V_{DC}$ @ 1 A |
| **Contact Resistance** | < 100 mW |
| **Operation Time** | 5 ms max. |
| **Insulation Resistance** | 100 MW |
| **Life Expectancy** | AC: 5 x $10^5$ @ 110 V/0.3 A<br>DC: 5 x $10^5$ @ 24 V/1.25 A |
| **Relay Type** | SPDT (Single-Pole Double-Throw) Form C |
| **Release Time** | 5 ms max. |

### General

| | |
|---|---|
| **Dimensions (L x W)** | PCLD-785: 114 x 220 mm (4.5" x 8.7")<br>PCLD-785B: 132 x 220 mm (5.2" x 8.7") |
| **Power Consumption** | +5 V @ < 100 mA; +12 V @ 33 mA for each relay |
| **Connectors** | 20-pin connector:<br>+5 $V_{DC}$: Jumper select either PC bus or external supply<br>+12 $V_{DC}$: Jumper select either PC bus or external supply<br>50-pin connector: external 12 V supply |

## Ordering Information

| | |
|---|---|
| **PCLD-785** | 16-ch Relay Board w/ One 1m 20-pin Flat Cable |
| **PCLD-785B** | 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables |
| **PCL-10120-1** | 20-pin Flat Cable, 1 m |
| **PCL-10120-2** | 20-pin Flat Cable, 2 m |
| **PCL-10150-1.2** | 50-pin Flat Cable, 1.2 m |



PCLD-885

## Features

- Accepts 20-pin or 50-pin (Opto-22 compatible) connectors
- 16 single-pole single-throw (SPST) relays
- High-power relay handles up to 5 A @ 250 $V_{AC}$
- Onboard varistors protect all relay contact points
- Industrial screw terminals for ease of wiring
- LED status indicators
- +5 V/+12 V power/status LED indicator

## Specifications

### Relay

| | |
|---|---|
| **Channels** | 16 |
| **Contact Rating** | AC: 250 V @ 6 A<br>DC: 30 V @ 5 A |
| **Contact Resistance** | 30 mΩ max. |
| **Insulation Resistance** | 1000 mΩ @ 500 $V_{DC}$ |
| **Life Expectancy** | >100,000 cycles at rated load |
| **Relay On Time** | 6 ms max. |
| **Relay Off Time** | 3 ms max. |
| **Relay Type** | SPST (Form A), normally open |

### Varistor

| | |
|---|---|
| **Clamping Voltage** | 760 V (10 A) |
| **Max. Peak Current** | 1,200 A for 8 msec. |
| **Max. Applied Voltage** | 300 $V_{RMS}$ AC continuous |
| **Varistor Voltage** | 470 V (current = 1 mA) |

### General

| | |
|---|---|
| **Power Consumption** | 12 V @ 22 mA for each relay,<br>352 mA if all relays energized; 5 V @ 200 mA max. |
| **Connectors** | |
| Input: | 20-pin flat cable or 50-pin Opto-22 compatible |
| Output: | Barrier strip screw terminal |
| **Dimensions (L x W)** | 205 x 114 mm (8" x 4.5") |
| **Operating Temperature** | 0 ~ 60° C (32 ~ 140° F) |

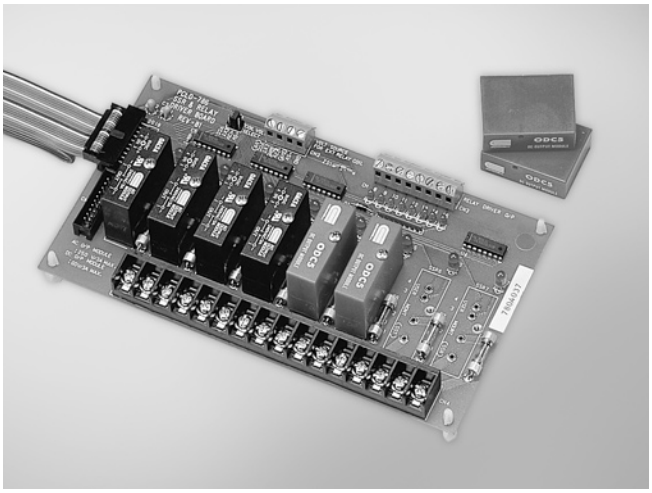
## Ordering Information

| | |
|---|---|
| **PCLD-885** | 16-ch Power Relay Board w/ 20p & 50p Flat Cables |

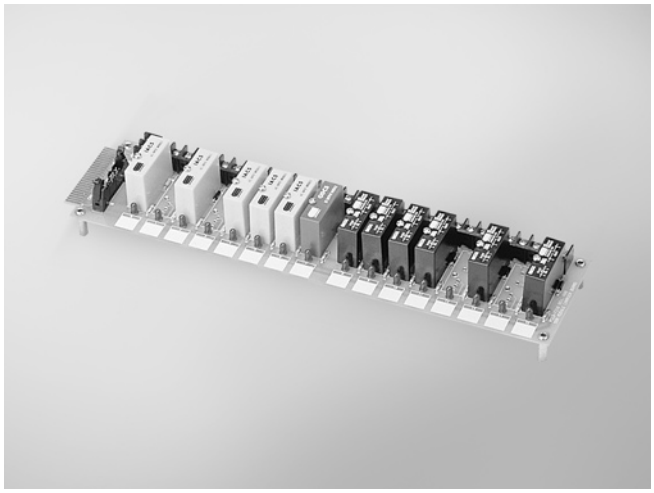
# PCLD-786
# PCLD-7216

## 8-ch SSR I/O Module Carrier Board

## 16-ch SSR I/O Module Carrier Board



PCL-10120-1 PCLD-786 PCLM-ODC5



PCLD-7216

## Features

- Up to eight AC or DC solid state relay modules
- Photo-coupler isolated operation
- Eight external relay drivers
- LED status indicators

## Specifications

### AC Solid State Relays

- **1 Cycle Surge** 40 A
- **Blocking Voltage** ±600 V min.
- **Off Leakage Current** 8 mA max.
- **On-state Voltage** 1.6 V max.
- **Output Rating** 24 ~ 280 $V_{AC}$ @ 3.0 A
- **Turn On** zero volts
- **Turn On/Turn Off Time** < ½ cycle
- **Type** PCLM-OAC5A

### DC Solid State Relays

- **1 Second Surge** 5 A
- **OFF Leakage Current** 1 mA max.
- **ON-state Voltage** 1.4 V max.
- **Output Rating** 5 ~ 60 $V_{DC}$ @ 3.0 A
- **Turn On/Turn Off Time** 750 µs max.
- **Type** PCLM-ODC5

### External Relay Drivers

- **Channels** 8
- **Coil Driving Voltage** +5 V, +12 V from PC or external source
- **Driver Type** ULN2003, open collector type
- **Max. Driving Current** 125 mA each channel

### General

- **Dimensions (L x W)** 205 x 114 mm (8.1" x 4.5")

## Ordering Information

- **PCLD-786** 8-ch SSR I/O Module Board w/ 20-pin Flat Cable

**Note:** PCLD-786 does not include SSRs. They must be ordered by selecting single piece SSR modules according to your requirements.

- **PCLM-OAC5A** Single Piece AC SSR Module (280 $V_{AC}$, 3 A)
- **PCLM-ODC5** Single Piece DC SSR Module (60 $V_{DC}$, 3 A)

## Features

- Channel status reflected by onboard LED for easy monitoring
- Onboard fuse protection

## Specifications

| Module type | | Field side | | Logic side |
|---|---|---|---|---|
| **Output Modules** | **Part No.** | **Output Voltage Rating** | **Output Current Rating** | **Input Logic and SSR Status** |
| AC Output | PCLM-OAC5A | 24 ~ 280 $V_{AC}$ | 3.0 $A_{AC}$ | TTL low (On) |
| | | 12 ~ 280 $V_{AC}$ | | TTL high (Off) |
| DC Output | PCLM-ODC5 | 5 ~ 60 $V_{AC}$ | 3.0 $A_{C}$ | TTL low (On) |
| | | | | TTL high (Off) |
| **Input Modules** | **Part No.** | **Input On Voltage** | **Input Off Voltage** | **Output Logic and On/Off Status** |
| AC Input | PCLM-IAC5A | 180 ~ 280 $V_{AC}$ | < 80 $V_{AC}$ | TTL low (On) |
| | | | | TTL high (Off) |
| DC Input | PCLM-IDC5B | 3 ~ 32 $V_{AC}$ | < 1 $V_{AC}$ | TTL low (On) |
| | | | | TTL high (Off) |

### Input Modules

**Field Side:**

- **Input On/Off Voltage Range** PCLM-IAC5: 90 ~ 140 V/45 $V_{RMS}$
  PCLM-IAC5A: 180 ~ 280 V/80 $V_{RMS}$
  PCLM-IDC5B: 3 ~ 32 V/1 $V_{DC}$
- **Input Resistance** PCLM-IAC5: 14 kΩ, PCLM-IAC5A: 44 kΩ, PCLM-IDC5B: 1.5 kΩ
- **Turn On/Off Time** PCLM-IAC5: 20 msec. max., PCLM-IAC5A: 20 msec. max. PCLM-IDC5B: 100 msec. max.

**Logic Side:**

- **Breakdown Voltage** 30 $V_{DC}$
- **Output Current** 100 mA max.
- **Output Voltage Drop** 0.4 V max.
- **Supply Current** 12 mA max.
- **Supply Voltage** 4 ~ 6 V

### Output Modules

**Field Side:**

- **Current Rating** 3 A max. (@ 25° C)
- **Contact Voltage Drop** 1.6 V max.
- **Turn On/Off Time** PCLM-OAC series: ½ AC cycle max.
  PCLM-ODC series: 100 µsec/750 µsec. max.

**Logic Side:**

- **Input Resistance** 220 Ω
- **Supply Voltage** 4 ~ 6 V
- **Supply Current** 12 mA max.

### General

- **Logic Side Connectors** 50-pin edge connector, Opto-22 compatible
- **Dimensions (L x W x H)** 367 x 111 x 56 mm (14.4" x 4.4" x 2.2")

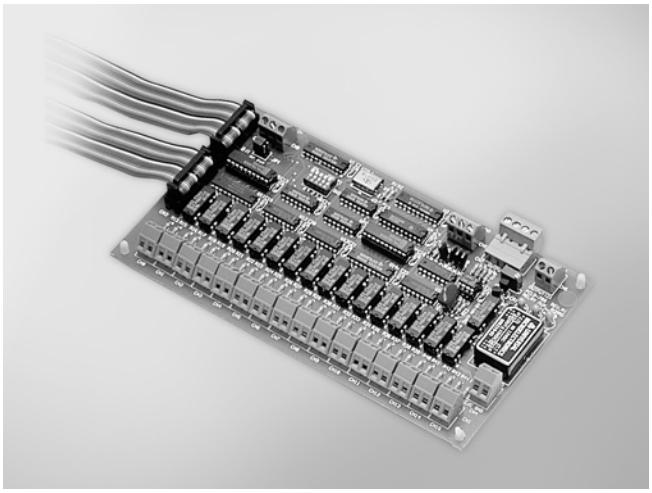
## Ordering Information

- **PCLD-7216** 16-ch SSR I/O Module Carrier Board

**Note:** PCLD-7216 does not include SSRs. They must be ordered by selecting single piece SSR modules according to your requirements.

# PCLD-788

## 16-ch Relay Multiplexer Board



## Features

- 16 to 1 channel expansion
- Differential and fully isolated multiplexing
- Break-before-make relay control
- "Channel closed" signal for precise A/D triggering
- Up to 16 PCLD-788s can be cascaded for 256 channels
- Easy wiring for large channel count configuration
- Onboard cold-junction circuitry for thermocouple measurement

## Introduction

PCLD-788 multiplexes 16 channels into a single I/O channel of an A/D converter, voltmeter or IEEE-488-based instrument. Up to 16 PCLD-788s can be cascaded for a total of 256 fully-isolated differential channels. The PCLD-788 can be controlled by any PC-LabCard™ product via a 16-bit 20-pin digital output port, found on cards such as the PCL-711B, PCL-812PG or the PCL-818 series. Channel selection (0-15) and board selection (0-15) are done by programming the high-order four bits and low order four bits of a digital output byte from the main I/O card in use.

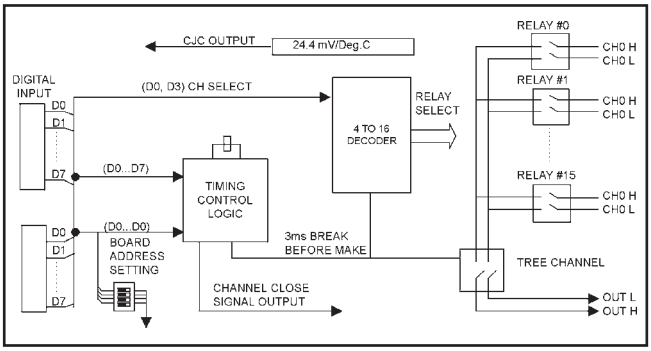
## Specifications

### I/O

- **Channel Closed Signal** TTL-level pulse
- **Cold-junction Sensor Output** +24.4 mV/° C, 0 V at 0° C
- **Contact Rating** Break-before-make with 3 msec. minimum break time
- **Contact Resistance** 200 Ω max.
- **Input Channels** 16 isolated differential inputs
- **Programming** DO bit 0, 1, 2 and 3 for channel selection, DO bit 4, 5, 6 and 7 for board selection. Onboard DIP switches for board-address setting
- **Max. Input Voltage** 100 $V_{DC}$ or 100 V peak AC
- **Max. Switching Current** 0.5 A
- **Max. Switching Power** 10 VA
- **Operating Time** 1 ms max.
- **Relay Life Expectancy** 100 million cycles min. at 10 $V_{DC}$ and 1 mA
- **Release Time** 1 msec. max.

### General

- **Certifications** CE
- **Connectors**
  - Controller: 2 x 20-pin box header, second connector in parallel for daisy chaining
  - I/O: Screw terminals
- **Dimensions (L x W)** 205 x 114 mm (8" x 4.5")
- **Mounting** 4 x screw holes for flat surface mounting
- **Power Consumption** +5 V @ 380 mA max.




**PCLD-788 Block Diagram**

## Pin Assignments

CN2 & CN3

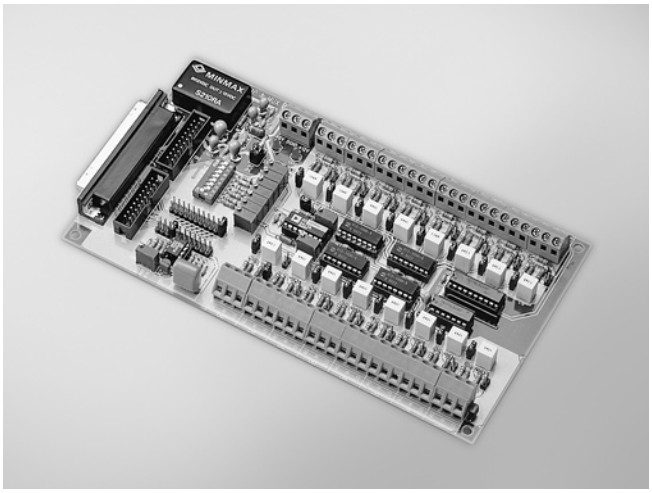
| | | | |
|---|---|---|---|
| C0 | 1 | 2 | C1 |
| C2 | 3 | 4 | C3 |
| C4 | 5 | 6 | C5 |
| C6 | 7 | 8 | C7 |
| | 9 | 10 | |
| | 11 | 12 | |
| | 13 | 14 | |
| | 15 | 16 | |
| GND | 17 | 18 | GND |
| +5V | 19 | 20 | +12V |

## Ordering Information

- **PCLD-788** 16-ch Relay MUX Board w/ Two 20-pin Flat Cables
- **PCL-10120-1** 20-pin Flat Cable, 1 m
- **PCL-10120-2** 20-pin Flat Cable, 2 m

# PCLD-789D

## Amplifier and Multiplexer Board



## Features

- Multiplexes 16 differential inputs to one A/D input
- Expands a PC-LabCard™ product's analog inputs to 128 channels
- High-grade instrumentation amplifier provides switch selectable gains of 1, 2, 10, 50, 100, 200, 1,000
- Onboard cold-junction compensation circuits for direct thermocouple measurement
- Built-in signal conditioning functions include filter, attenuator and current shunt
- Second connectors onboard allow daisy chaining
- Screw-clamp terminal blocks permit easy and reliable connections

CE

## Introduction

PCLD-789D is a front-end signal conditioning and channel multiplexing daughterboard for use with PC-LabCard™ product's analog input ports. It multiplexes 16 differential input channels into a single A/D converter input channel. You can cascade up to ten PCLD-789Ds, allowing a single data acquisition card to access 160 analog input channels.

PCLD-789D has DB37 and 20-pin flat cable connectors and lets your PCL-818L or PCL-818HD access up to 128 channels without using an additional digital output cable to select channels. The PCLD-789D uses a high-grade instrumentation amplifier that provides switch-selectable gains of 1, 2, 10, 50, 100, 200 and 1,000. This amplifier lets you accurately measure low-level signals with your PC-LabCard™ product. The board also contains a cold-junction sensing circuit that allows direct temperature measurement from thermocouple transducers. A wide variety of thermocouples are supported with software compensation and linearization.

## Specifications

### I/O

- **Cold-junction Compensation** +24.4 mV/° C, 0 V at 0° C
- **Input Channels** 16 differential
- **Input Conditions**

| Gains | CMRR | Nonlinearity | Setting Time |
|---|---|---|---|
| 1,000 | 125 dB | 0.005% FSR | 75 µsec. |
| 100 | 115 dB | 0.005% FSR | 15 µsec. |
| 10 | 105 dB | 0.007% FSR | 15 µsec. |
| 1 | 85 dB | 0.015% FSR | 15 µsec. |

- **Input Range** ±10 V max. depending on the selected gain
- **Output Range** ±10 V max.
- **Overvoltage Protection** ±30 V continuous

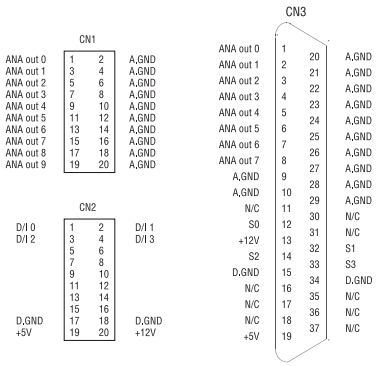
### General

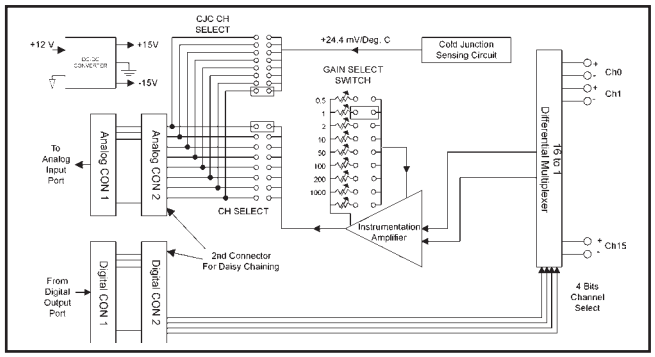
- **Certifications** CE
- **Connectors**
  Controller: 1 x DB37 male connector
  2 x 20-pin box header for daisy chaining
  I/O: Screw terminals
- **Dimensions (L x W)** 205 x 114 mm (8.1" x 4.5")
- **Mounting** 4 x screw holes for flat surface mounting
- **Power Consumption** +5 V @ 30 mA max, +12 V @ 80 mA max.

## Ordering Information

- **PCLD-789D** Amplifier and Multiplexer Board w/ 1m DB37 Cable
- **PCL-10137-1** DB37 Cable, 1 m
- **PCL-10137-2** DB37 Cable, 2 m
- **PCL-10137-3** DB37 Cable, 3 m
- **PCL-10120-1** 20-pin Flat Cable, 1 m
- **PCL-10120-2** 20-pin Flat Cable, 2 m

## Pin Assignments




**Block Diagram**

# ADAM-3900 Series

## DIN-rail Terminal Boards

### ADAM-3909

**DB9 DIN-rail Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for PC-LabCard™ products with DB9 connector
- Case dimensions (W x L x H): 77.5 x 45 x 51 mm (3.1" x 1.8" x 2.0")

**To Be Used With**

PCI-1714U/UL, PCL-728, PCL-740, PCL-741, PCL-743B, PCL-745B

### ADAM-3920

**20-pin DIN-rail Flat Cable Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for PC-LabCard products with 20-pin connector
- Case dimensions (W x L x H): 77.5 x 67.5 x 51 mm (3.1" x 2.7" x 2.0")

**To Be Used With**

PCI-1735U, PCL-711B, PCL-720+, PCL-726, PCL-727, PCL-730, PCL-812PG, PCL-816, PCL-818 Series, PCL-836

### ADAM-3925

**DB25 DIN-rail Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for PC-LabCard products with DB25 connector
- Screw-clamp terminal blocks allow easy and reliable connections
- Case dimensions (W x L x H): 77.5 x 56.3 x 51 mm (3.1" x 2.2" x 2.0")

**To Be Used With**

PCI-1757UP, PCL-833

### ADAM-3937

**DB37 DIN-rail Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for DAQ cards with DB37 female connector
- Case dimensions (W x L x H): 77.5 x 146.3 x 51 mm (3.1" x 5.8" x 2.0")

**To Be Used With**

PCI-1713, PCI-1715U, PCI-1718HDU, PCI-1720U, PCI-1730, PCI-1733, PCI-1734, PCI-1750, PCI-1760U, PCI-1761

### ADAM-3950

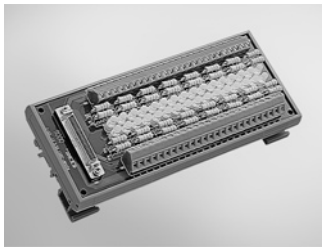
**50-pin DIN-rail Flat Cable Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for PC-LabCard™ products with 50-pin flat cable connector
- Case dimensions (W x L x H): 77.5 x 146.3 x 51 mm (3.1" x 5.8" x 2.0")

**To Be Used With**

USB-4751/L, PCI-1737U, PCI-1739U, PCL-722, PCL-724, PCL-731



### ADAM-3951

**50-pin DIN-rail Wiring Board w/ LED Indicators**

**Features**

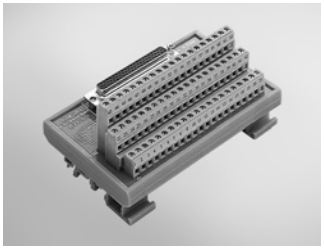
- Low-cost DIN-rail mounting wiring terminal module for PCI-1752/1754/1756 with 50-pin SCSI female connector
- Screw-clamp terminal blocks allow easy and reliable connections
- Each LED indicates its current bi-directional I/O logic status with either green or red light
- Case dimensions (W x L x H): 77.5 x 179.5 x 41.5 mm (3.1" x 7.1" x 1.6")

**To Be Used With**

PCI-1752U, PCI-1754, PCI-1756

# ADAM-3900 Series

## DIN-rail Terminal Boards



### ADAM-3962

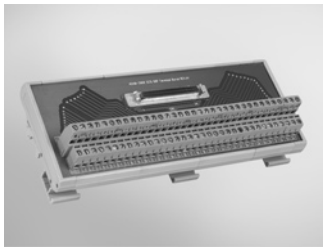
**DB62 DIN-rail Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for DAQ cards with DB62 female connector
- Screw-clamp terminal blocks allow easy and reliable connections
- Case dimensions (W x L x H): 77.5 x 124.5 x 63.5 mm (3.1" x 4.9" x 2.5")

**To Be Used With**

PCI-1762



### ADAM-3968

**68-pin DIN-rail SCSI Wiring Board**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for industrial applications with 68-pin SCSI female connector
- Case dimensions (W x L x H): 77.5 x 191.2 x 51 mm (3.1" x 8.4" x 2.0")

**To Be Used With**

PCI-1710/L, PCI-1710HG/HGL, PCI-1711/L, PCI-1712/L, PCI -1716/L, PCI-1741U, PCI-1742U, PCI-1747U, PCI-1721, PCI-1723, PCI-1751, PCI-1753, PCI-1723, PCI-1780U

### ADAM-3968/20

**68-pin SCSI to 3 20-pin Box Header Terminal**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for PC-LabCard™ products with 68-pin SCSI connectors
- Converts one 68-pin SCSI connector to three 20-pin connectors
- Case dimensions (W x L x H): 77.5 x 80 x 54.3 mm (3.1” x 3.2" x 2.1")

**To Be Used With**

PCI-1751, PCI-1753

### ADAM-3968/50

**68-pin SCSI to 2 50-pin Box Header Terminal**

**Features**

- Low cost universal DIN-rail mounting screw terminal module for PC-LabCard™ products with 68-pin SCSI connectors
- Converts one 68-pin SCSI connector to two 50-pin Opto-22 compatible box headers
- Case dimensions (W x L x H): 77.0 x 101.0 x 54.3 mm (3.0" x 4.0" x 2.1")

**To Be Used With**

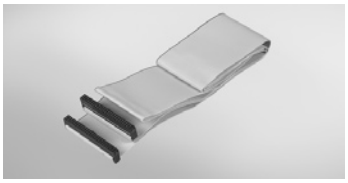
PCI-1751, PCI-1753

# Cable Accessories

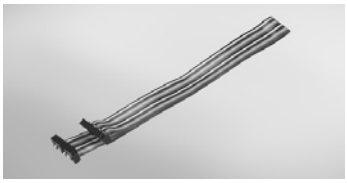
**PCL-1010B**
BNC to BNC Cable, Male

**PCL-10250**
100-pin SCSI to Two 50-pin SCSI Cable

**PCL-101100**
SCSI Cable 100-pin Male 1m w/ Bolt Screw



**PCL-10150**
50-pin Flat Cable



**PCL-10120**
20-pin Flat Cable

**PCL-10251**
100-pin to Two 50-pin SCSI Cable for PCI-1240

**PCL-10121**
20-pin Shielded Cable

**PCL-10125**
DB25 Cable

**PCL-10268**
100-Pin to Two 68-pin SCSI Cable

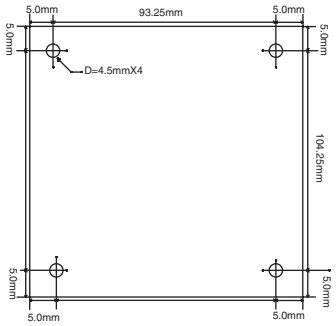
**PCL-10137/H**
DB37 Cable

**PCL-10168**
68-pin SCSI Shielded Cable

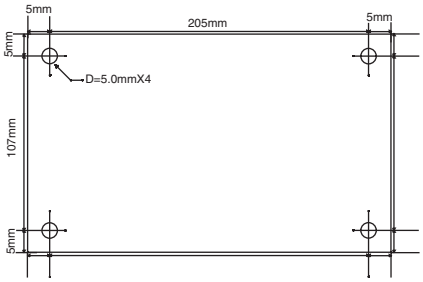
**PCL-10901**
PS/2 to DB9 Cable

# Terminal Board Dimensions

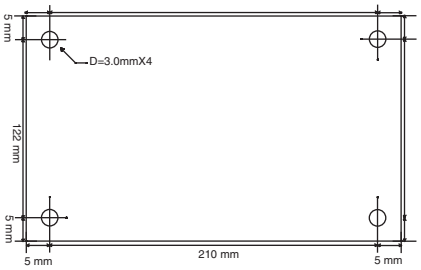
## PCLD-780



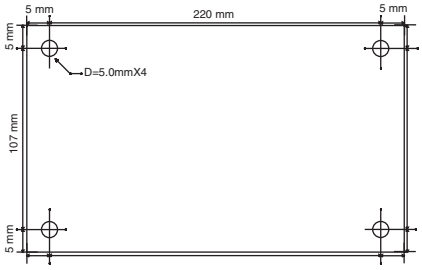

## PCLD-782



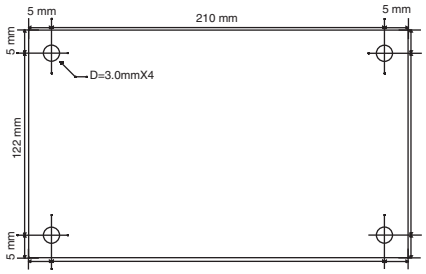

## PCLD-782B



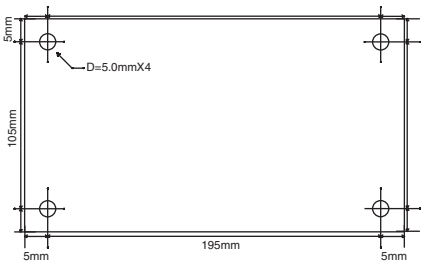

## PCLD-785



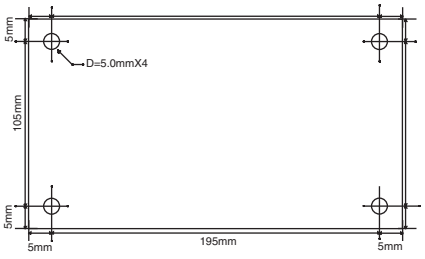

## PCLD-785B



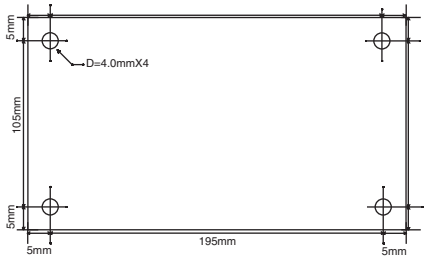

## PCLD-786



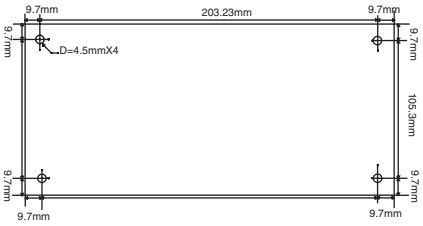

## PCLD-788



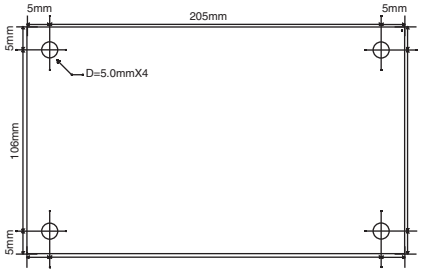

## PCLD-789D



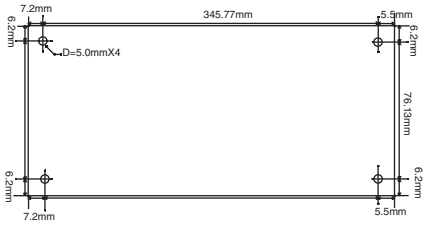

## PCLD-880




## PCLD-885




## PCLD-7216




## PCLD-8710