

Introduction

The PCLD-8710 Screw-terminal Board provides convenient and reliable signal wiring for the PCI-1710 and PCI-1710HG, both of which have a 68-pin SCSI-II connector.

This screw terminal board also includes cold junction sensing circuitry that allows direct measurement of thermocouples transducers. Together with software compensation and linearization, every thermocouple type can be accommodated.

Due to its special PCB layout you can install passive components to construct your own signal-conditioning circuits. The user can easily construct a low-pass filter, attenuator or current shunt converter by adding resistors and capacitors on to the board's circuit pads.

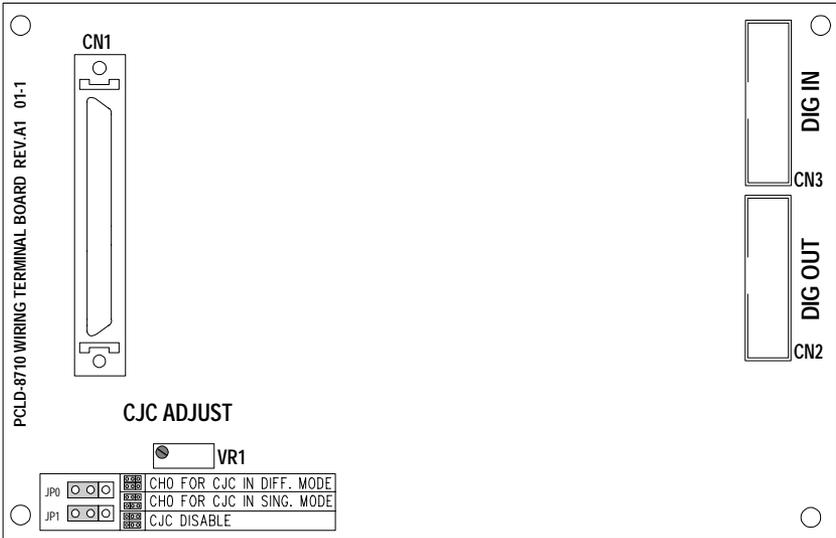
Features

- Low-cost screw-terminal board for the PCI-1710 and PCI-1710HG with 68-pin SCSI-II connector.
- On-board CJC (Cold Junction Compensation) circuits for direct thermocouple measurement.
- Reserved space for signal-conditioning circuits such as low-pass filter, voltage attenuator and current shunt.
- Industrial-grade screw-clamp terminal blocks for heavy-duty and reliable connections.
- DIN-rail mounting case for easy mounting.
- Dimensions: 169 mm (W) x 112mm (L) x 51mm (H) (6.7" x 4.4" x 2.0")

Applications

- Field wiring for the PCI-1710 and PCI-1710HG equipped with 68-pin SCSI-II connector .

Board Layout



CN1: 68-pin SCSI-II connector for connection with the PCI-1710/ PCI-1710HG

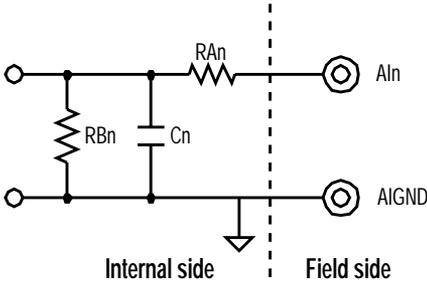
CN2: 20-pin connector for digital output

CN3: 20-pin connector for digital input

VR1: Variable resistor for CJC sensing transducer adjustment

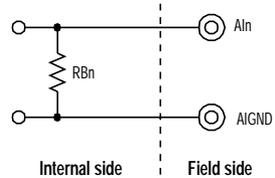
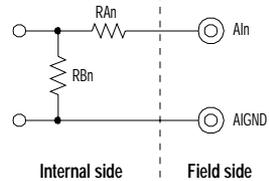
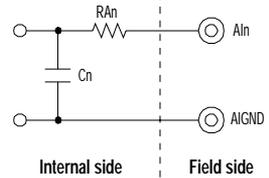
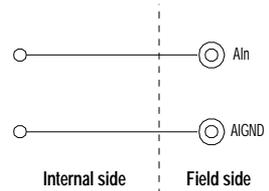
JP0, 1: Jumpers for CJC setting

Single-ended Connections

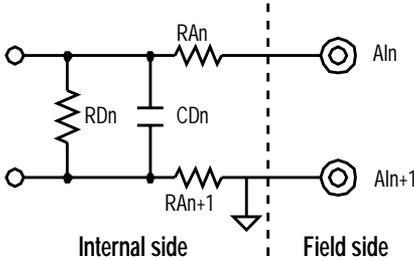


where $n = 0, 1, 2, \dots, 15$

- a) Straight-through connection**
 (factory setting)
 $R_{An} = 0 \ \Omega$ (short)
 $R_{Bn} = \text{none}$
 $C_n = \text{none}$
- b) 1.6 kHz (3dB) low pass filter**
 $R_{An} = 10 \ \text{k}\Omega$
 $R_{Bn} = \text{none}$
 $C_n = 0.01 \ \mu\text{F}$
 $f_{\text{c dB}} = \frac{1}{2\pi k R_{An} C_n}$
- c) 10 : 1 voltage attenuator:**
 $R_{An} = 9 \ \text{k}\Omega$
 $R_{Bn} = 1 \ \text{k}\Omega$
 $C_n = \text{none}$
 $\text{Attenuation} = \frac{R_{Bn}}{R_{An} + R_{Bn}}$
- d) 4 ~ 20 mA to 1 ~ 5 V_{DC} signal converter:**
 $R_{An} = 0 \ \Omega$ (short)
 $R_{Bn} = 250 \ \Omega$ (0.1% precision resistor)
 $C_n = \text{none}$



Differential Connections



where $n = 0, 2, 4, \dots, 14$

a) Straight-through connection

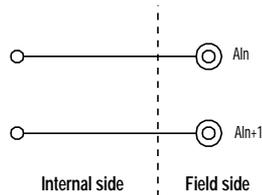
(factory setting):

$R_{An} = 0 \Omega$ (short)

$R_{An+1} = 0 \Omega$ (short)

$R_{Dn} = \text{none}$

$C_{Dn} = \text{none}$



b) 1.6 kHz (3dB) lowpass filter

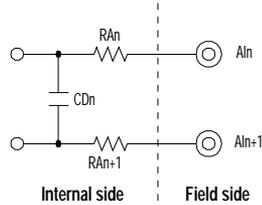
$R_{An} = 5 \text{ k}\Omega$

$R_{An+1} = 5 \text{ k}\Omega$

$R_{Dn} = \text{none}$

$C_{Dn} = 0.01 \mu\text{gF}$

$$f_{3dB} = \frac{1}{2\pi k(R_{An} + R_{An+1} + 1) C_{Dn}}$$



c) 10 : 1 voltage attenuator:

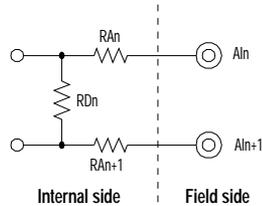
$R_{An} = 4.5 \text{ k}\Omega$

$R_{An+1} = 4.5 \text{ k}\Omega$

$R_{Dn} = 1 \text{ k}\Omega$

$C_n = \text{none}$

$$\text{Attenuation} = \frac{R_{Dn}}{R_{An} + R_{An+1} + R_{Dn}}$$



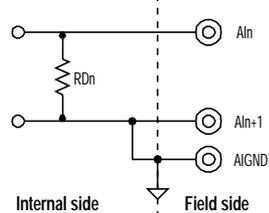
d) 4 ~ 20 mA to 1 ~ 5 V_{DC} signal converter:

$R_{An} = 0 \Omega$ (short)

$R_{An+1} = 0 \Omega$ (short)

$R_{Dn} = 250 \Omega$ (0.1% precision resistor)

$C_{Dn} = \text{none}$

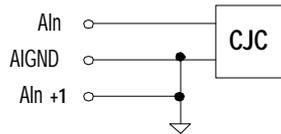


CJC Output (Channel 0)

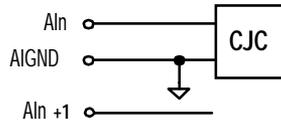
The PCLD-8710 provides on-board CJC (Cold Junction Compensation) for thermocouple measurement.

Through the setting of jumpers JP0 and JP1 you control disabling of the CJC circuitry and single-ended or differential mode. The jumper settings are as follows:

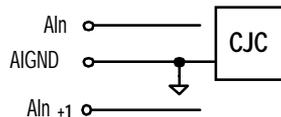
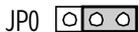
Differential mode, CJC enabled



Single-ended mode, CJC enabled



CJC disabled



where $n = 0, 2, 4, \dots, 14$

Calibration of the CJC Circuitry

When the PCLD-8710 leaves our factory it is calibrated. To maintain accuracy, it is necessary to check and calibrate the PCLD-8710 on a regular basis. In order to calibrate the board, you need the following:

- A temperature sensor that is connected to the PCLD-8710
- The PCI-1710/1710HG board
- A program that can read the PCI-1710/1710HG card

Note: *Advantech provides the CJCCAL.EXE program, which allows the user to calibrate the PCLD-8710 easily.*

- A digital precision thermometer.

1. Jumper settings:

Set the jumpers of the PCLD-8710 to single-ended mode: JP0  JP1 

Notice that the analog input channel AI0 of the PCI-1710/1710HG should also be set to single-ended mode.

2. Temperature measurement

Measure the temperature at the temperature sensor with the digital thermometer.

3. Calculations

Use the following formula to calculate the calibration voltage:

$$V_t = 10 \text{ (mV/}^\circ\text{K)} \times T \text{ (}^\circ\text{K)}$$

where

V_t : the calibration voltage

T : measured temperature in $^\circ\text{K}$, and

$$x \text{ }^\circ\text{K} = (x - 273.2) \text{ }^\circ\text{C}, x \geq 0$$

For example, if the temperature is 25°C (298°K), the calibration voltage would be

$$10\text{mV} \times 298 = 2.98 \text{ V}$$

4. Data acquisition

Use the CJCCAL.EXE program to read the voltage output of the PCLD-8710 to AI0 of the PCI-1710/1710HG.

5. Calibration

Adjust the voltage output from VR1 of the PCLD-8710 until the voltage output reading corresponds to the environmental temperature.

Refer to " Board Layout " on page 2.

