PSH32-TC6 Shielded Cable with Thermocouple Miniconnectors

This installation guide describes how to install and connect thermocouples and digital I/O signals to the PSH32-TC6 shielded cable with thermocouple miniconnectors for use with your NI 4350 (PCMCIA).

Introduction

The PSH32-TC6 shielded cable with thermocouple miniconnectors consists of a pod with six miniconnectors that connect your thermocouples to the NI 4350. This pod connects to the NI 4350 input/output (I/O) connector with a shielded cable. You can also access the four digital I/O (DIO) lines and digital ground of the NI 4350 using the detachable screw terminal connector located on the pod.

This cable is designed specifically for ease of use with thermocouples. The cable features isothermal construction to minimize the temperature gradients across the thermocouple junctions and a high-accuracy thermistor cold-junction temperature sensor.

The pod provides connections to all NI 4350 DIO lines and to all but two analog input channels (CH). CH0 is dedicated to the cold-junction sensor and CH1 is dedicated to auto-zeroing circuitry. Refer to the *NI 4350/4351 User Manual* for further details about these two channels.

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What You Need to Get Started

You need the following items to set up and use your PSH32-TC6:

- ❑ PSH32-TC6 shielded cable with thermocouple miniconnectors
- ❑ *PSH32-TC6 Shielded Cable with Thermocouple Miniconnectors Installation Guide*
- ❑ NI 4350 (PCMCIA) and documentation
- ❑ Thermocouple with a miniconnector
- ❑ 1/8 in. flathead screwdriver
- ❑ Wire cutter
- ❑ Wire insulation stripper
- ❑ Adhesive hook-and-loop fastener strip

Signal Connections

Refer to your *NI 4350/4351 User Manual* for signal connection examples.

Connecting Thermocouples

Insert your thermocouple miniconnector to the mating miniconnector on the thermocouple pod, as shown in Figure 1. Each miniconnector is polarized; that is, it has two spades of different widths so that you can insert the thermocouple in only one way.

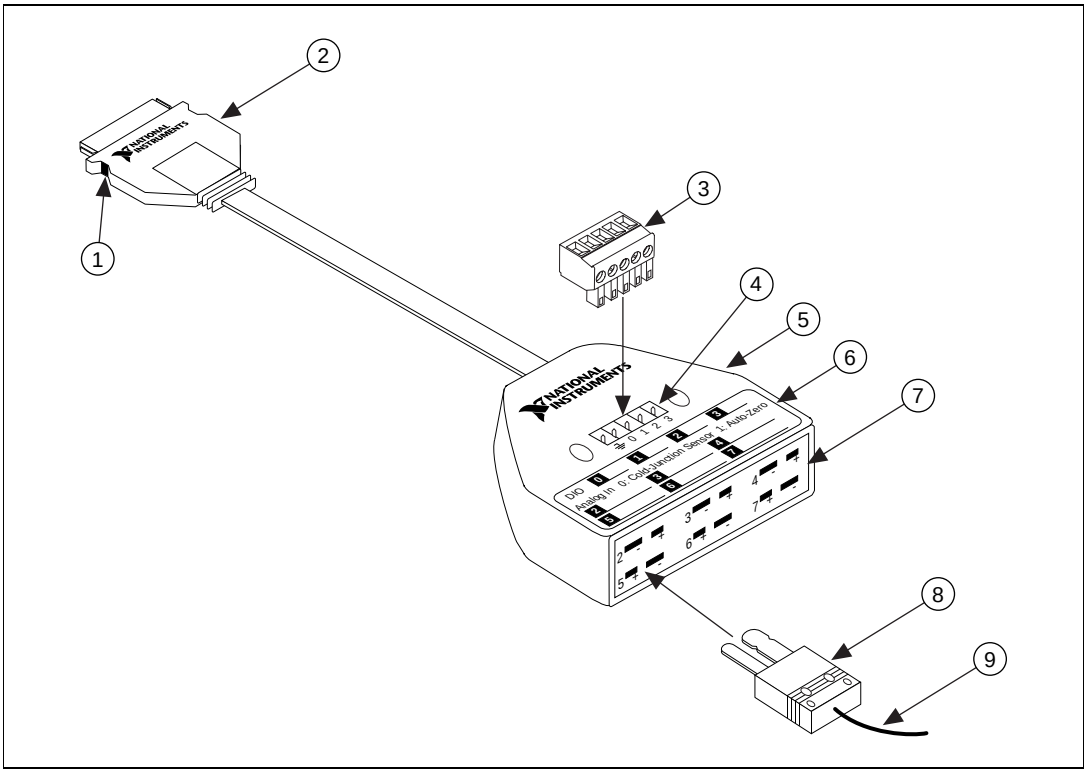
Do not force the miniconnector; if you encounter difficulty while inserting the miniconnector, check whether the polarity is correct.

Connecting DIO Signals

Refer to Figure 1 as you perform the following steps to connect your digital signals to your PSH32-TC6:

1. Use a wire cutter and wire insulation stripper to strip the wire ends as necessary to connect them to the screw terminals.
2. Loosen the screws in the screw terminals with the 1/8 in. flathead screwdriver.
3. Insert the stripped wires into the screw terminals. Tighten the screws with the 1/8 in. flathead screwdriver.

The wires should be firmly connected.



1	Ejector Ears	4	Screw Terminal Receptacle	7	Miniconnector Receptacles
2	NI 4350 Connector	5	Thermocouple Pod	8	Miniconnector
3	Screw Terminals for DIO	6	Label	9	Thermocouple

Figure 1. PSH32-TC6 Parts Locator Diagram

Connecting to the PSH32-TC6 to Your NI 4350 (PCMCIA)

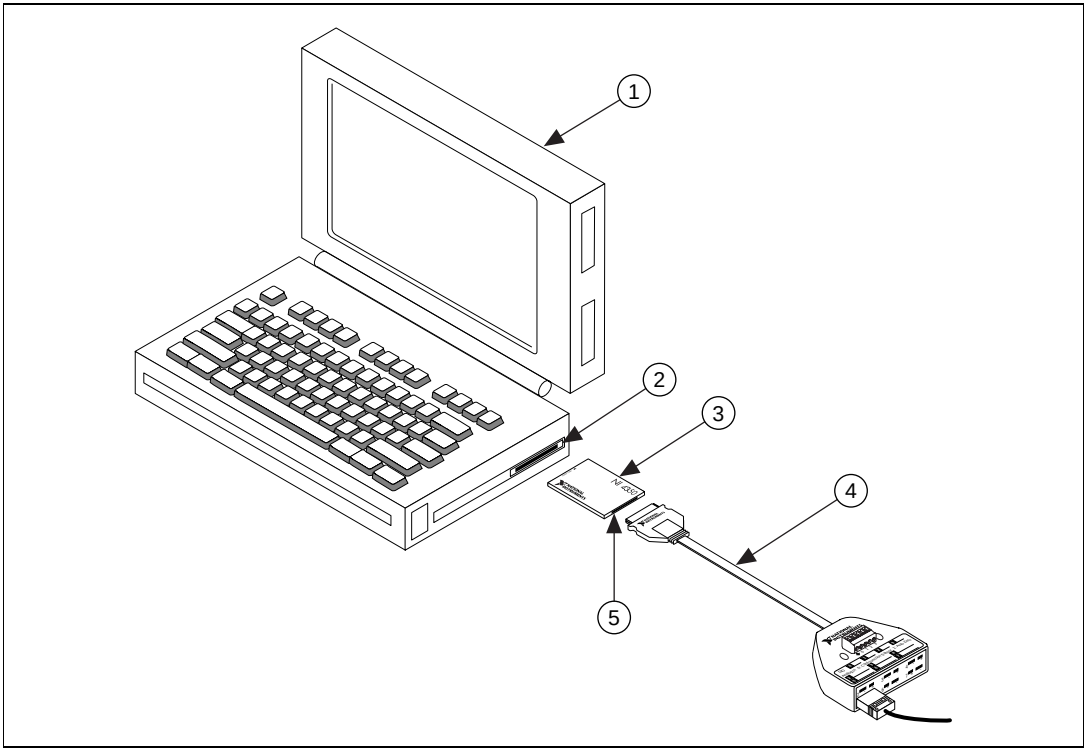
Attach the connector end of the PSH32-TC6 cable to the NI 4350 I/O connector, as shown in Figure 2. The two connectors should snap together.

To disconnect the cable from the NI 4350, press inward on the two ejector ears on the cable backshell and gently pull on the backshell. The cable should pop out. Do not pull the cable.

You can use the adhesive hook-and-loop fastener to attach the thermocouple receptacle end of the cable to any flat surface.

Note ***To minimize the temperature gradient inside the thermocouple pod and thus maintain its isothermal nature for accurate cold-junction compensation, place the PSH32-TC6 away from extreme temperature differentials.***

Caution ***The connectors of both the NI 4350 and the PSH32-TC6 are polarized. You can attach them in only one way. Do not force the cable when inserting it into or removing it from the NI 4350 connector. If you encounter difficulty, check whether the polarity is correct.***



1	Portable Computer	3	NI 4350 (PCMCIA)	5	NI 4350 (PCMCIA) I/O Connector
2	PCMCIA Slot	4	PSH32-TC6 Shielded Cable		

Figure 2. Connecting the Cable Assembly to the NI 4350 (PCMCIA)

Cold-Junction Temperature Sensor

The PSH32-TC6 cold-junction temperature sensor consists of a precision thermistor excited by the 25 µA current source on the NI 4350. At 25 °C, the resistance of the thermistor is 5,000 Ω. The thermistor resistance varies from 16,305 to 1,492 Ω over the 0 to 55 °C temperature range. The corresponding sensor output voltage varies from 408 to 37 mV over this temperature range.

To select and measure the temperature sensor, refer to your data acquisition software documentation for programming information.

Alternatively, you can use the following formulas to convert the cold-junction sensor voltage to cold-junction temperature:

$$T(°C) = T_K - 273.15$$

where T_K is the temperature in kelvin.

$$T_K = \frac{1}{a + b \bullet lnR_T + c \bullet (ln\ R_T)^3}$$

$a = 1.295361 \times 10^{-3}$

$b = 2.343159 \times 10^{-4}$

$c = 1.018703 \times 10^{-7}$

R_T = resistance of the thermistor in ohms

$$T(°F) = \frac{T(°C) \bullet 9}{5} + 32$$

where T(°F) and T(°C) are the temperature readings in degrees Fahrenheit and degrees Celsius, respectively.

Specifications

Cold-junction sensor accuracy[1] ..... 0.06 °C from 15 to 35 °C
0.2 °C from 0 to 15 °C
and 35 to 55 °C

Maximum working voltage[2]
(signal + common mode) ..... Each input should remain
within ±42 V of ground

[1] Includes only the thermistor accuracy. The combined effects of the temperature sensor accuracy, as well as the current source accuracy due to tolerances in all components in the NI 4350, the effects caused by temperature and loading, and self-heating and current leakage are discussed in the *NI 4350/4351 User Manual*.

[2] Refer to the NI 4350 maximum working voltage specification in Appendix A, *Specifications*, of the *NI 4350/4351 User Manual*; use the lower number of the two.

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