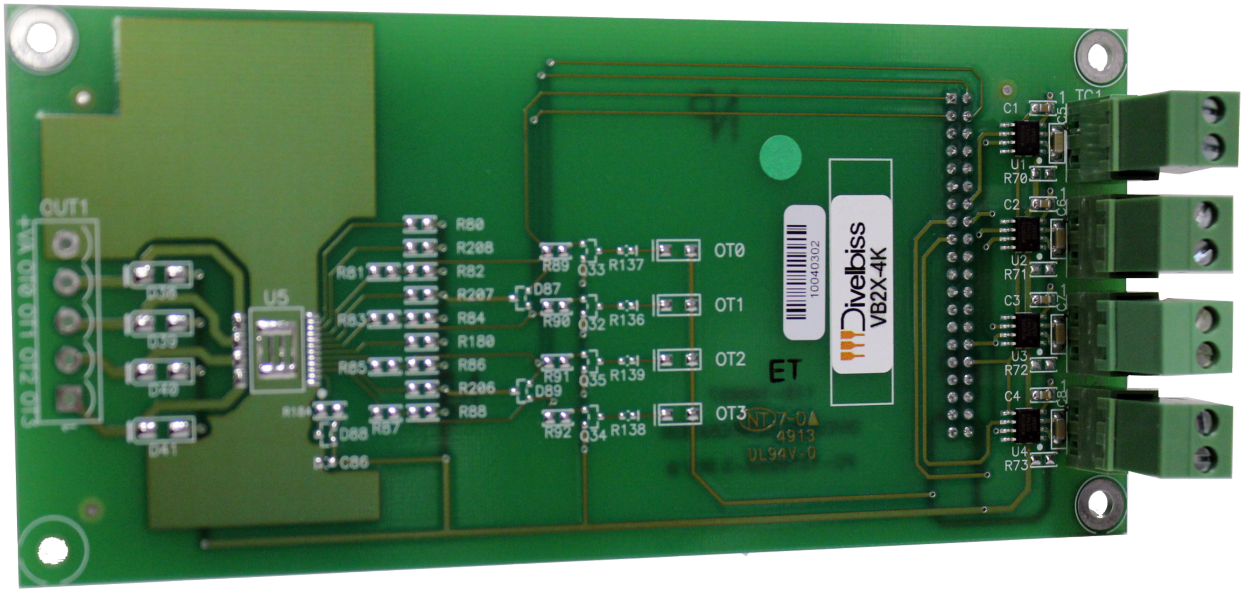
# USER'S MANUAL

Revision: 0




# VB2X-TC THERMOCOUPLE EXPANDER BOARD

**Covered Models:** VB2X-4K

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# Manual Contents

## Getting Started



## VB2X-TC Features



**WARNING!!**

**The VB-2XXX with the VB2X-TC installed, as with other programmable controllers must not be used alone in applications which could be hazardous to personnel in the event of failure of this device. Precautions must be taken by the user to provide mechanical and/or electrical safeguards external to this device. This device is NOT APPROVED for domestic or human medical use.**



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# Getting Started

This section explains how to read this manual and understand the symbols and information that it contains.

To begin using your VB2X-TC Expander, you will need to follow these steps:

- Install the VB2X-TC on the VB-2XXX Controller
- Configure the VB-2XXX Controller to use the VB2X-TC in the EZ LADDER Toolkit Project Settings.

Refer to the appropriate sections of this manual for details on the above items.

## How to Use this Manual

In this manual, the following conventions are used to distinguish elements of text:

| | |
|---|---|
| **BOLD** | Denotes labeling, commands, and literal portions of syntax that must appear exactly as shown. |
| *italic* | Used for variables and placeholders that represent the type of text to be entered by the user. |
| SMALL CAPS | Used to show key sequences or actual buttons, such as OK, where the user clicks the OK button. |

In addition, the following symbols appear periodically in the left margin to call the readers attention to specific details in the text:

Warns the reader of a potential danger or hazard associated with certain actions.

Appears when the text contains a tip that is especially useful.

Indicates the text contains information to which the reader should pay particularly close attention.

All Specifications and Information Subject to Change without Notice

## Install the VB2X-TC Expander on the VB-2XXX Controller

The VB-2XXX and VB2X-TC are purchased separately. Before the VB2X-TC may be used, it must be installed as the expansion option on the VB-2XXX controller. You will need full access to the VB-2XXX top and bottom. It is recommended to disconnect and un-mount the VB-2XXX prior to beginning this installation.

### To Install the VB2X-TC (example: VB2X-4K)

1. Un-mount and disconnect the VB-2XXX Controller

2. Using the 4 metal spacers and 4 of the screws provided, install the spacers on the VB-2XXX controller in the provided expansion holes as shown in Figure 1-1. The male side (threaded post) of the spacer will go through the VB-2XXX board from the top to bottom. Install 4 Lock washer and 4 nuts to the spacers (on the back side).

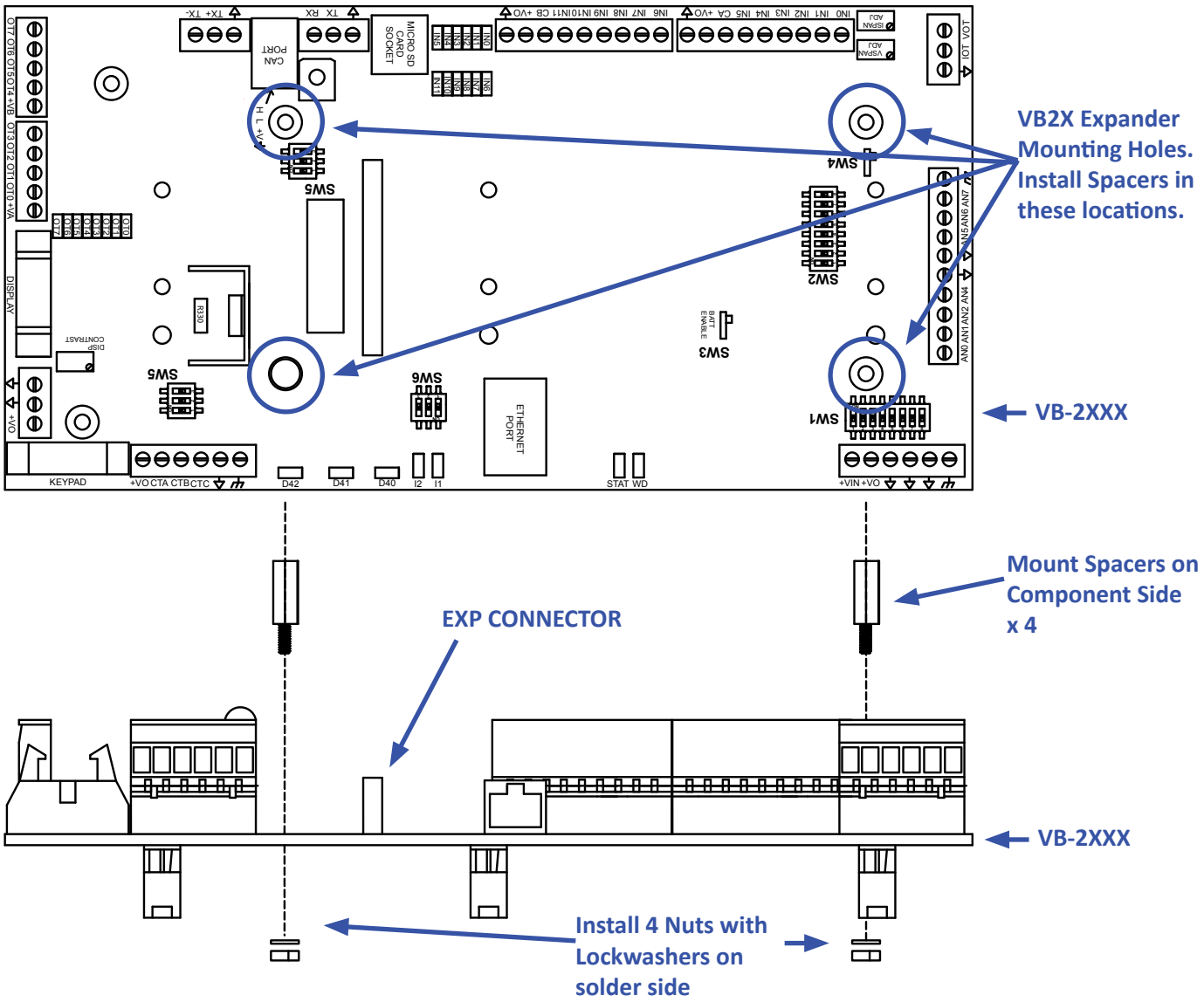


**Figure 1-1 - Installation of Spacers**

3. Carefully aligning the VB2X-TC with the installed spacers, gently plug the VB2X-TC into the EXP connector on the VB-2XXX. Ensure proper alignment on EXP. When installed correctly, all the VB2X-TC pins will be plugged into the EXP connector and the VB2X-TC will be placed against the spacers and the mounting holes will align with the spacers correctly. Refer to Figure 1-2.

4. Install the remaining 4 screws and lockwashers provided to secure the VB2X-TC to the VB-2XXX controller (installed spacers).

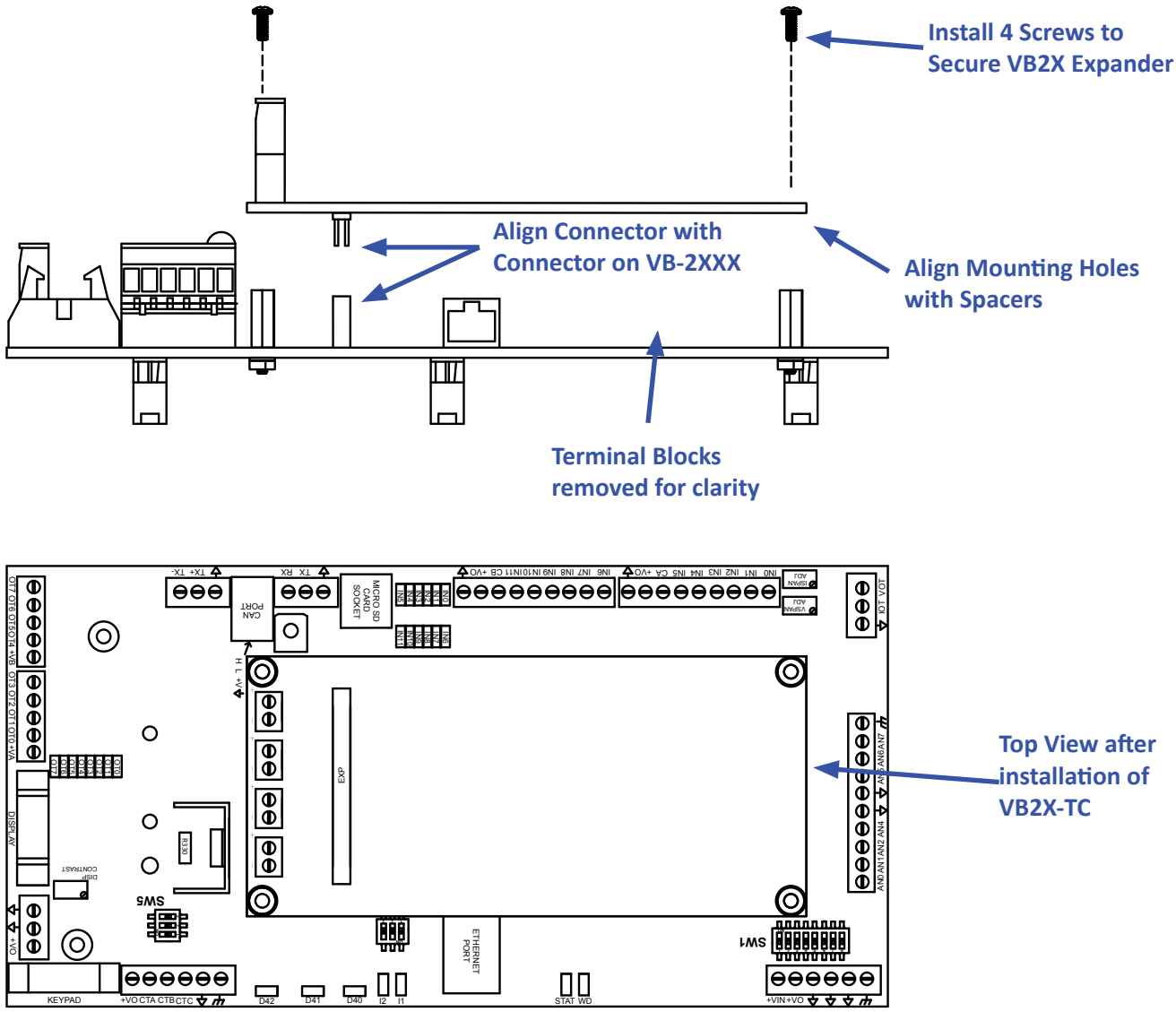


**Figure 1-2 - Mounting the VB2X-TC**

## *Configuring the VB2X-TC in EZ LADDER Toolkit*

It is assumed that you are familiar with the VB-2XXX before installing this expansion option. Please refer to the VB-2XXX User Manual for details regarding the VB-2XXX.

Before you can begin using features on the VB2X-TC, it must be configured as an option for the VB-2XXX target within the EZ LADDER Toolkit. For help with installing or using EZ LADDER, please refer to the P-Series EZ LADDER Toolkit Manual.

1. In EZ LADDER, from the File Menu at the top, click **PROJECT** then **SETTINGS**. This will open the Project Settings Window. Select **VB-2000** as the target from the choices. Refer to Figure 1-3.

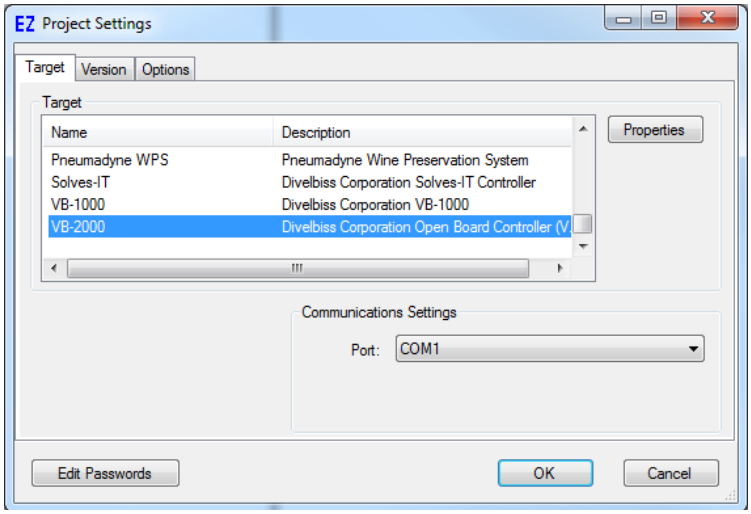


**Figure 1-3 - Project Settings Window**

2. Click the **PROPERTIES** button to the right side of the window. The VB-2000 Properties Window will open. Make sure the proper model is selected in the drop-down menu. If any expansion board was installed previously, it would be listed in the **Expansion Pane**.

3. Highlight the ***I/O Expansion*** in the list and click the **PROPERTIES** button on the right side of the Expansion pane in the VB-2000 Properties Window. The I/O Expansion Properties Window will open. Refer to Figure 1-4.

4. Select the VB2X-4K expansion board from the list of Expansion boards. Refer to Figure 1-4. The Details section of the window will update with the devices supported on the expander (for reference only) that will be installed in the project settings of the program.

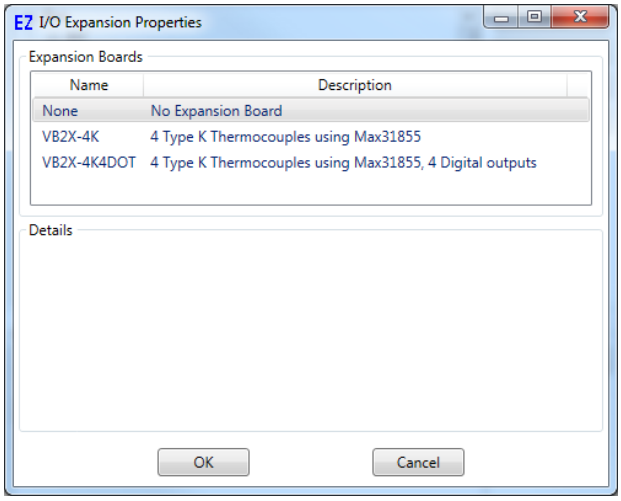


**Figure 1-4 - I/O Expansion Properties**

5. Click **OK** to accept the VB2X-4K and close the I/O Expansion Properties Window.

6. Click **OK** to close the *VB-2000 Properties* window. Click **OK** to close the Project Settings window.

7. Save your ladder diagram using the menu **FILE** and **SAVE** or **SAVE AS** to save the current settings in your program.

The VB2X-4K expander is now installed. The real variables TC1-TC4 are automatically created and represent the temperature of each thermocouple input channel (1-4) in degrees C.

## Getting to Know the VB2X-TC

The VB2X-TC is an expander for the VB-2XXX controller. The VBEX-TC provides up to 4 Thermocouple inputs. The following models are supported as VB2X-TC expanders. See Figure 1-5.

| Model # | Description |
|---|---|
| **VB2X-4K:** | VB2X-TC expander with 4 Type K Thermocouples |

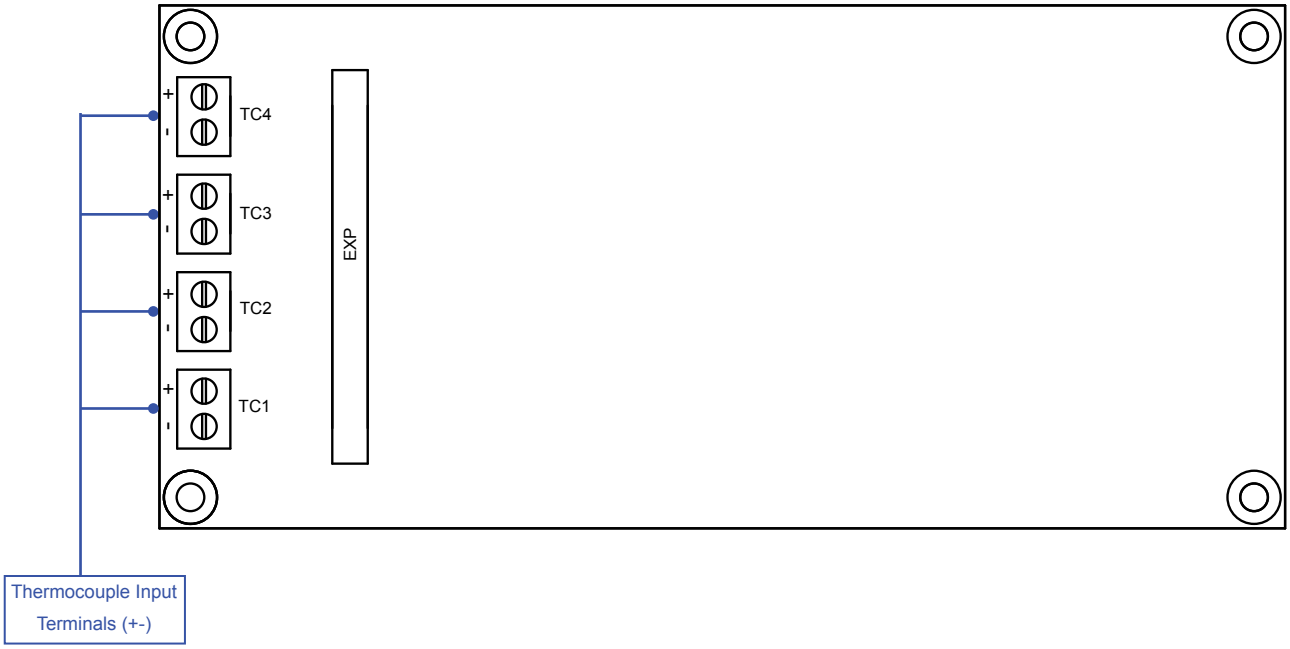


**Figure 1-5 - VB2X-TC Features**

## Additional Thermocouple Types

Other thermocouple types, (J, N, R, S) are available upon request. Please consult the factory for availability of VB2X expansion with these thermocouple types.

# VB2X-TC Features

This section explains the VB2X-TC Expander hardware features, options and information regarding EZ LADDER Toolkit for basic operation.

## Thermocouple Inputs

The VB2X-TC provides up to 4 Thermocouples. The type and quantity of each thermocouple input is based on the actual Model Number of the Expander ordered.

| Model # | Description |
|---|---|
| **VB2X-4K:** | VBEX-TC expander with 4 Type K Thermocouples |

Each thermcouple input is represented in the EZ LADDER Toolkit ladder diagram using (Real) variables labeled TC1 - TC4. These variables were created automatically when the VB2X-TC expander was configured as the expansion option for the VB-2XXX target.

Each variable (TC1- TC4) will represent the actual temperature read by the connected thermocouple in degrees Celsius. If you wish to have temperatures in degrees Fahrenheit, you must convert the values using mathematical function blocks in your ladder diagram program. Each thermocouple channel internally has all the required cold-junction compensation and linearization required.

### Thermocouple Input Connections

For each of the thermocouple inputs (TC1-TC4), a + and - terminal are provided. Refer to Figure 1.5 for locations of the thermocouple input terminals and their polarity. Figure 2-1 illustrates a typical thermocouple connection.

When connecting thermocouples, connect the thermocouple wire directly to the terminals provided. When mounted in an enclosure, ensure that only thermocouple wire of the appropriate type is used for the connections between the VBEX-TC thermocouple terminals and the actual enclosure entry. Failure to use the proper thermocouple wire will result in incorrect temperature readings.

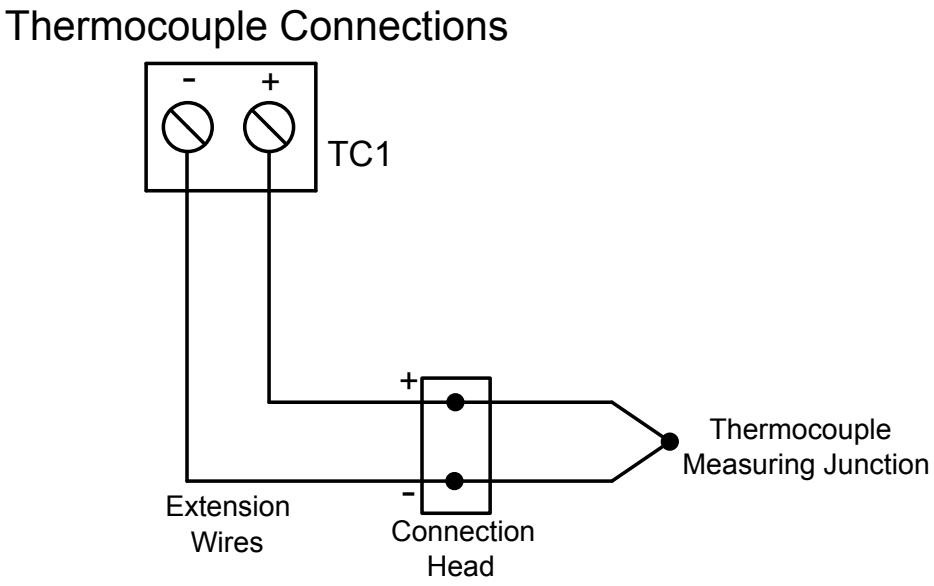


**Figure 2-1 - Typical Thermocouple Input Connection**

The operating temperature range of the expander may vary based on model number. The VB-2XXX is rated for -40°C to +80°C, but some expanders may not operate under this full range. The controller and expander should only be installed where the temperature range of the narrowest window between the controller and the expander is sufficient.



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## VB2X-TC Specifications

| | |
|---|---|
| Type K Thermocouple Inputs: | Qty up to 4<br>Measurement Range: -270°C to 1372°C<br>Resolution: 14 Bit, 0.25°C per bit<br>Accuracy -200°C to +700°C: +/- 2°C (Ambient -20°C to 80°C)<br>Accuracy +700°C to +1350°C: +/- 4°C (Ambient -20°C to 80°C)<br>Accuracy - 270°C to +1372°C: +/- 6°C (Ambient -40°C to 80°C) |
| Operating Temp: | -40°C to 80°C |
| Dimensions: | 2.9” Wide x 6.4” Length x .1.35” Tall. |
| Mounting: | Installs on VB-2XXX Controller, Stack Mount using #6 spacers and screws |
| Type: | Open Board |
| Storage Temperature: | -40-85°C |



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