
TB-414X

Specifications

2025-03-11



Contents

TB-414X Specifications 3

TB-414X Specifications

These specifications apply to the TB-414X Screw Terminal Connector Kit for PXIe-414x (NI Part Number 787611-01).



Notice This device is intended for use only with the PXIe-4140, PXIe-4141, PXIe-4142, PXIe-4143, PXIe-4144, PXIe-4145, and PXIe-4147 SMUs, which are referred to collectively as PXIe-414x SMUs. For more information about the PXIe-414x SMUs, refer to ni.com/manuals.

Related information:

- [TB-414X User Guide](#)

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- **Typical** specifications describe the performance met by a majority of models.
- **Nominal** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are **Warranted** unless otherwise noted.

Voltage, Current, and Resistance



Notice Refer to the specifications of the module with which you are using the TB-414X to note the maximum voltage and current ratings. The

specifications listed below are the maximum for the TB-414X only.

Channel operating voltage ¹	60 V DC
HI/LO pin current ²	3 A




Note It is critical to ensure that the LO terminal for each channel in use is connected when the total current from all channels exceeds 3 A. The TB-414X is rated for the force pins carrying a maximum of 3 A average current, however, individual pin currents above 4 A may damage or degrade the lifespan of the pins. Systems that have a common path between the LO of each channel at the DUT end of the cable must ensure that LO path wiring resistances are matched within $\pm 20\%$ to prevent the LO terminal of one channel from carrying a significant portion of another channel's LO current and exceeding the 4 A individual pin limit.


Force path resistance ³	30 m Ω , typical
------------------------------------	-------------------------


Leakage resistance ⁴	
23 °C	>100 T Ω , typical


1. Maximum voltage measured between the HI, HI Sense, LO, LO Sense, or Guard terminals. SMU specifications take precedence if the SMU model is rated for lower voltage.
2. SMU specifications take precedence if the SMU model is rated for lower current.
3. Combined resistance in the HI and LO force traces and connectors for a channel of the TB-414X. Does not include any output resistance contributions of the SMU module or user wiring. Refer to SMU module specifications to determine if this resistance is included in the voltage load regulation specification or if it should be accounted for separately.
4. Applies between HI and LO terminals. Leakage performance may be degraded for operation above 70% relative humidity. When transitioning a device from a storage or operation environment with operating humidity above 70%, allow the device to stabilize in the lower humidity environment for several hours before use.

Isolation


**Caution** Isolation voltage ratings apply to the voltage measured between any channel pin and the chassis ground. When operating channels in series or floating on top of external voltage references, ensure that no terminal exceeds this rating.

**Attention** Les tensions nominales d'isolation s'appliquent à la tension mesurée entre n'importe quelle broche de voie et la masse du châssis. Lors de l'utilisation de voies en série ou flottantes en plus des références de tension externes, assurez-vous qu'aucun terminal ne dépasse cette valeur nominale.

**Caution** Do not connect the TB-414X to signals or use for measurements within Measurement Categories II, III, or IV.

**Attention** Ne connectez pas le TB-414X à des signaux et ne l'utilisez pas pour effectuer des mesures dans les catégories de mesure II, III ou IV.

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as **MAINS** voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

**Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Isolation voltage, channel to earth ground ⁵	60 V DC, CAT I
---	----------------

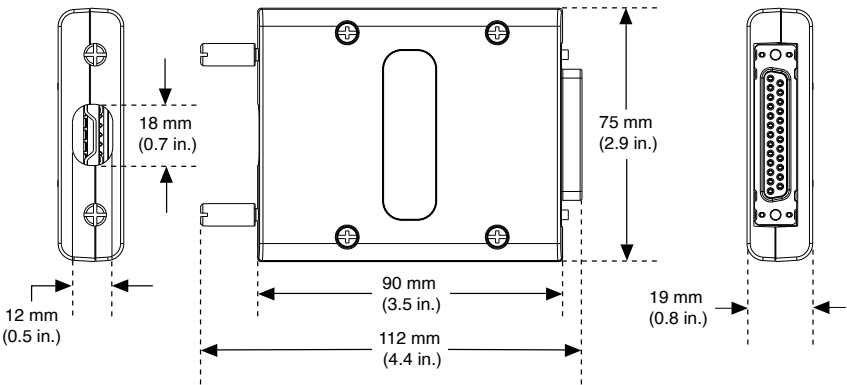
5. While TB-414X channels are isolated from each other, this isolation is considered functional isolation

Withstand voltage	800 V _{pk}
-------------------	---------------------

Screw Terminal Wiring

Screw terminal wire gauge	24 to 18 AWG
Length of bare wire (insulation stripped) from one end of the wire	5 mm to 6 mm (0.197 in. to 0.236 in.)
Screw terminal torque	0.5 Nm (4 lb · in.)
Spacing between screw terminals	3.5 mm (0.14 in.)

Figure 1. TB-414X Dimensions



Physical

Top cover and strain relief screws	#4-40
------------------------------------	-------

for the purpose of allowing the separation of return currents and is not intended to operate continuously under significant voltages or provide safety isolation. The TB-414X is intended for use with PXIe-414x SMUs which are isolated from earth ground, but share a common LO for all channels (bank isolation).

Top cover and strain relief screw torque	0.3 Nm (2.7 lb · in.)
Dimensions	112 mm × 74 mm × 19 mm (4.4 in. × 2.9 in. × 0.8 in.)
Weight	112 g (3.95 oz)

Environmental Guidelines



Notice This model is intended for use in indoor applications only.

Environmental Characteristics

Temperature and Humidity

Temperature	
Operating	0 °C to 55 °C ⁶
Storage	-40 °C to 71 °C
Humidity	
Operating	10% to 90%, noncondensing ⁷
Storage	5% to 95%, noncondensing

6. Not all chassis can achieve this ambient temperature range. Refer to PXI chassis specifications to determine the ambient temperature ranges your chassis can achieve. SMU specifications take precedence if the SMU model is rated for different operating temperatures.

7. When transitioning a device from a storage or operation environment with relative humidity above

Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)

Compliance and Standards

Safety Compliance Standards

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1



Note For safety certifications, refer to the product label or the [Product Certifications and Declarations](#) section.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the ***Engineering a Healthy Planet*** web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.


EU and UK Customers

-  **Waste Electrical and Electronic Equipment (WEEE)**—At the end of the product

70%, device should be allowed to stabilize in the lower humidity environment for several hours before use. Refer to the TB-414X **Voltage**, **Current**, and **Resistance** specifications for additional performance derating when operating above 70% relative humidity.

life cycle, all NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit ni.com/environment/weee.

电子信息产品污染控制管理办法（中国RoHS）

-  **中国RoHS**— NI符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于NI中国RoHS合规性信息，请登录 ni.com/environment/rohs_china。 (For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

Export Compliance

This product is subject to control under the U.S. Export Administration Regulations (15 CFR Part 730 et. seq.) administered by the U.S. Department of Commerce's Bureau of Industry and Security (BIS) (www.bis.doc.gov) and other applicable U.S. export control laws and sanctions regulations. This product may also be subject to additional license requirements of other countries' regulations.

Additionally, this product may also require export licensing before being returned to NI. The issuance of a Return Material Authorization (RMA) by NI does not constitute export authorization. The user must comply with all applicable export laws prior to exporting or re-exporting this product. See ni.com/legal/export-compliance for more information and to request relevant import classification codes (e.g. HTS), export classification codes (e.g. ECCN), and other import/export data.

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate

link.