TBX Terminal Blocks for SCXI

Terminal Block	Compatible SCXI Modules	Cabling	CJC	Special Features
TBX-1303	SCXI-1100, SCXI-1102, SCXI-1102B/C, SCXI-1181	SH96-96 or R96-96	✔	Open TC detection Isothermal construction, selectable ground referencing
TBX-1316	SCXI-1120/D, SCXI-1125, SCXI-1126	SH32-32-A	–	200:1 attenuation (up to 1000 VDC)
TBX-1325	SCXI-1124	SH48-48-A	–	High-voltage 250 VDC
TBX-1326	SCXI-1162, SCXI-1162HV, SCXI-1163, SCXI-1163R	SH48-48-B	–	High-voltage 250 VDC
TBX-1328	SCXI-1120, SCXI-1120D, SCXI-1121,SCXI-1125, SCXI-1126	SH32-32-A	✔	Sockets for current input resistors, Isothermal construction, High-voltage 250 VDC
TBX-1329	SCXI-1120, SCXI-1120D, SCXI-1121, SCXI-1125, SCXI-1126	SH32-32-A	–	Selectable AC coupling (rejects up to 250 VDC)
TBX-96	SCXI-1100, SCXI-1102, SCXI-1102B/C, SCXI-1104, SCXI-1181, SCXI-1104C	SH96-96 or R96-96	–	–
TBX-24F	All modules	user-supplied wiring	–	–
CB-50	SCXI-1180	NB1	–	–

** The TBX-24F is a general-purpose feedthrough terminal block that you can use with any SCXI module or front mounting terminal blocks.*

Table 1. Terminal Block Configuration Guide

Overview

TBX terminal blocks provide convenient connection of field I/O signals to SCXI modules. Consisting of prewired cables and DIN-rail mountable terminal blocks, the TBX system is an alternative to the front-mounting terminal blocks that attach directly to the front of an SCXI module.

The TBX system includes shielded cables that connect the front I/O connector of an SCXI module to a TBX terminal block. You can mount the TBX terminal block, which has convenient screw terminals for connection of field wiring, on a standard DIN rail. Some TBX terminal blocks also include a temperature sensor for cold-junction compensation when using thermocouples. Table 1 lists available TBX terminal blocks, compatible SCXI modules, and required cabling to connect the TBX terminal block.

Terminal Blocks

TBX terminal blocks provide screw terminals for convenient connection of field signals. The screw terminals pass the I/O signals to a DIN connector, which you cable directly to an SCXI module (see Figure 1). TBX terminal blocks, except the TBX-96 and TBX-1316 include a hardened plastic cover and hardware for mounting on a standard DIN rail.

Figure 1. TBX Terminal Block Cabled to SCXI Module

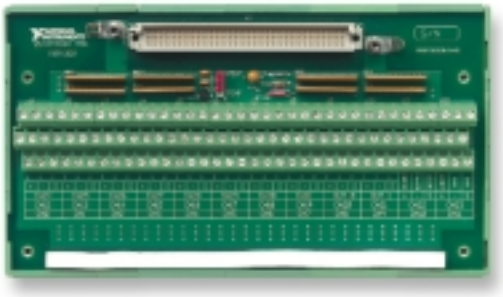

Figure 2. TBX-1303

TBX-1303 777207-03

The TBX-1303 (Figure 2), designed for thermocouples, is also very effective for general-purpose applications. This terminal block includes special features for thermocouples, including isothermal construction with a plastic cover to minimize thermal gradients, open-thermocouple detection circuitry, and automatic ground-referencing circuitry. When using the TBX-1303 with the SCXI-1102 Series or VXI-SC-1102 Series signal conditioning units, this terminal block provides a high-impedance path to ground, so that systems work reliably with either floating or ground-referenced thermocouples. For applications with the SCXI-1100, you can configure the channels to be ground-referenced or floating in blocks of eight channels. For general-purpose applications, this terminal block includes 108 terminals, including CH+, CH-, and shield for each input channel. The TBX-1303 also works with the SCXI-1181 breadboard module.

TBX Terminal Blocks for SCXI

Figure 3. TBX-1316

Figure 4. TBX-1326

Figure 5. TBX-1328

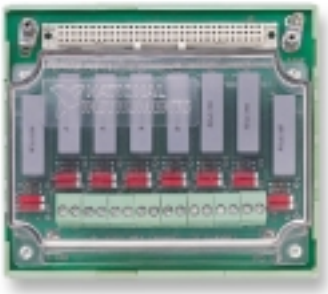

Figure 6. TBX-1329

TBX-96 777264-01

The TBX-96 is a mass termination terminal block that provides a generic solution for the SCXI-1100, SCXI-1102 Series, SCXI-1104 Series, and the SCXI-1140 Series.

TBX-1316 777207-16

With the TBX-1316 (Figure 3) high-voltage terminal block, you can extend the input range of the SCXI-1120/D, SCXI-1125, or SCXI-1126 modules to ±1000 VDC (680V_{rms}) Each input channel includes a 200:1 attenuation circuit, and offers a positive, negative, and ground terminal for up to 12-gauge wire. All signal connections are made inside of this enclosure that can be panel-mounted or simply placed on a desktop. The hinged lid makes accessing the signals easier during configuration, but also includes a keyed lock for safety. The TBX-1316 is rated for Category III installations.

TBX-1325 777207-25

The TBX-1325 is a terminal block with 30 screw terminals for signal connections to the SCXI-1124 module. You cable the TBX-1325 to the SCXI-1124 with the SH48-48-A shielded cable.

TBX-1326. 777207-26

The TBX-1326 (Figure 4) is a high-voltage terminal block with 48 screw terminals for signal connections to the SCXI-1162, SCXI-1162HV, SCXI-1163, and SCXI-1163R modules. You can cable the TBX-1326 to the SCXI module with the SH48-48-B shielded cable. Warning: The TBX-1326 and SH48-48-B limit the maximum working common-mode voltage between banks or between banks and earth ground to 250 V_{rms} maximum.

TBX-1328 777207-28

The TBX-1328 (Figure 5) is a terminal block for use with the SCXI-1120, SCXI-1120D, SCXI-1121, SCXI-1125, and SCXI-1126 modules. The TBX-1328 includes a total of 24 screw terminals, including three terminals (CH+, CH-, and chassis ground) for each input channel and sockets for the installation of resistors for 4 to 20 mA inputs. When used with thermocouples, the TBX-1328 maximizes measurement accuracy with an isothermal construction and a plastic cover that minimizes thermal gradients across the terminal block and the resulting errors.

TBX-1329 777207-29

The TBX-1329 (Figure 6) provides selectable AC coupling for the SCXI-1120, SCXI-1120D, SCXI-1121, SCXI-1125, and SCXI-1126 modules. Each channel of the TBX-1329 terminal block includes selectable AC coupling circuitry that can reject up to 250 VDC. The screw terminals on the TBX-1329 are pluggable.

TBX-24F 777276-01

The TBX-24F is a general-purpose screw terminal block with feedthrough connections for 24 signal lines. You connect the TBX-24F to the SCXI module with discrete wires connected to a standard SCXI terminal block. For example, you can use two TBX-24F blocks to terminate the I/O lines for a single SCXI-1160 relay module, which requires 48 signal connections (16 relays, three lines per relay). You individually wire the TBX-24F to a standard SCXI-1324 terminal block, which attaches directly to the front of the SCXI-1160 module. This example configuration is diagrammed in Figure 7.

TBX Terminal Blocks for SCXI

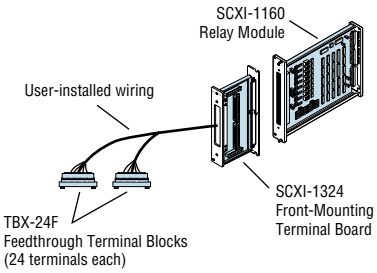

Figure 7. TBX-24F and SCXI-1160 Configuration

Figure 8. TBX-RM1 Rack-Mount Assembly

Terminal Block	Width Required (of TBX-RM1 Rack-Mount)
TBX-1303	One-half
TBX-1325, TBX-1326, TBX-1328, TBX-1329, TBX-24F, CB-50	One-third

Table 2. Rack-Mount Widths of Terminal Blocks

Cable Assemblies

Shielded cable assemblies connect SCXI modules to TBX terminal blocks. The cable assemblies screw securely into a metal adapter that attaches to an SCXI module like a front-mounting terminal block.

Cable Resistance

When used with SCXI modules that source an analog output voltage, such as the SCXI-1124 or excitation voltage of the SCXI-1121, the wire resistance of the shielded cable (0.21 Ω/m per wire) can introduce errors caused by voltage drops in the cable. For example, the SCXI-1124 analog output module can source a maximum of 5 mA in voltage output mode. Therefore, a 2 m SH48-48-A cable, with a total resistance of 0.42 Ω/m per channel (two wires per channel), can reduce the output voltage by up to 5 mA * 0.42 Ω/m * 2 m = 4.2 mV.

Backshell Kit

SBS-96F 777253-01

The SBS-96F is a shielded backshell kit for building custom cables to connect the TBX-1303 to an SCXI-1100, SCXI-1102, SCXI-1102B/C, SCXI-1104, or SCXI-1181. The SBS-96F includes one 96-pin DIN connector with solder cups for connection of field wires.

Rack-Mount Assembly

TBX-RM1 777290-01

The TBX-RM1 rack-mount assembly (Figure 8) holds TBX terminal blocks in standard 19 in. rack-enclosures. The TBX-RM1 includes a standard DIN rail mounted on a recessed metal panel, with wiring ducts for routing of field wiring. The top and bottom of the TBX-RM1 are removable for convenient reconfiguration. The TBX-RM1 can accommodate two TBX-1303 terminal blocks, three small terminal blocks (TBX-1325, TBX-1326, TBX-1328, TBX-1329, or TBX-24F), or one TBX-1303 and one small terminal block (Table 2). The TBX-RM1 does not support the TBX-1316 High-Voltage attenuator terminal block.

TBX Selection Guide

Use the following steps to select the correct combination of TBX terminal blocks and cables for your SCXI system:

1. Select the required terminal blocks – for each SCXI module, use Table 1 to select the proper TBX terminal block. If a TBX-13xx terminal block is not available for your SCXI module, select the appropriate number of general-purpose TBX-24F feedthrough terminal blocks.
2. Select cabling – for each TBX terminal block, Table 1 lists the cable needed to connect the TBX terminal block to the SCXI module. Shielded cables are available in lengths of 1, 2, and 5 m.

   If using the TBX-1303, you also have the option to build a custom cable using the SBS-96F backshell kit. For each TBX-1303 for which you will build a custom cable, select two SBS-96F kits.

   If using the TBX-24F, you will use discrete wires to connect the TBX-24F to an SCXI front-mounting terminal block. Therefore, select the appropriate SCXI front-mounting terminal block for each SCXI module that will use the TBX-24F.
3. Rack-mount accessory (optional). If mounting for 19 in. rack enclosures is needed, use Table 2 to select the appropriate number of TBX-RM1 rack-mount kits.

Ordering Information

Cables

SH96-96 shielded cable 1 m 183228-01
SH48-48-A shielded cable 1 m 183229-01
SH48-48-B shielded cable 1 m 183499-01
SH32-32-A shielded cable 1 m 183230-01
R96-96 ribbon cable 1 m 183425-01

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SCXI, TBX and BNC Terminal Block Specifications

Specifications

SCXI Terminal Blocks

Typical for 25 ˚C unless otherwise noted.

Cold-Junction Sensor

Accuracy and repeatability[1]

Terminal Block	Accuracy 15 to 35 ˚C	Accuracy 0 to 15 ˚C and 35 to 55 ˚C	Repeatability
SCXI-1300	1.3 °C	1.3 °C	0.5 °C
SCXI-1303[2]	0.5 °C	0.85 °C	0.35 °C
SCXI-1320	1.3 °C	1.3 °C	0.5 °C
SCXI-1321	1.3 °C	1.3 °C	0.5 °C
SCXI-1322	0.8 °C	1.2 °C	0.4 °C
SCXI-1327	0.9 °C	1.3 °C	0.5 °C
SCXI-1328	0.5 °C	0.9 °C	0.2 °C

Cold-Junction sensor output
- SCXI-1300, SCXI-1320, SCXI-1321 ..... 10 mV/˚C
- SCXI-1303/1322/1327/1328 ..... 1.91 V (at 0 ˚C) to 0.58 V (at 55 ˚C)

Maximum field wire gauge
- SCXI-1300/1302/1303/1314/1322/1324 ..... 26-16 AWG
- SCXI-1301/1304/1313/1315/1320/1321/1325/1327/1328/1331/1332 ..... 26-14 AWG

AC coupling (SCXI1304 and SCXI-1305)
- Corner frequency ..... 0.16 Hz
- DC rejection capacity ..... ±50 VDC

Current input SCXI-1308 and SCXI-1338 ..... 0 to 20 mA

BNC-2095, TC-2095

Input connectors
- BNC-2095 ..... 32 BNC connectors
- TC-2095 ..... 32 thermocouple plugs, uncompensated

Output (to SCXI module) ..... 96-pin DIN

Cold-junction sensor (TC-2095)
- Output ..... 1.91 V (0 ˚C) to 0.58 V (55 ˚C)
- Accuracy (15 to 35 ˚C)[5] ..... 0.5 ˚C for SCXI-1102/B/C; 0.65 ˚C for SCXI-1100
- Repeatability (15 to 35 ˚C)[5] ..... 0.35 ˚C for SCXI 1102/B/C; 0.5 ˚C for SCXI-1100

Signal referencing
- CH+ input ..... 10 MΩ to +5 V, user switchable
- CH- input ..... 10 MΩ or +10Ω to ground, user switchable

Physical

Dimensions ..... 49.3 x 4.3 x 18.8 cm (19.0 by 1.7 by 7.4 in.)

TBX Terminal Blocks

Typical for 25˚ C unless otherwise noted.

Maximum working voltage (signal + common mode)
- TBX-1316 ..... 1000 VDC, 680 V_{rms}
- TBX-1325 ..... 250 V_{rms}[3]
- TBX-1326/1328/1329/1324F ..... 300 V_{rms}

Signal referencing on TBX-1303
- CH+ input ..... 10 MΩ to +5 V (socketed)
- CH- input ..... 10 MΩ or 10 Ω to ground (user configurable, socketed)

Input Inpedance for TBX-1316
- Differential ..... 40 MΩ
- Single-Ended ..... 20 MΩ

Absolute accuracy for TBX-1316
- Gain error 1%
- Temperature drift ..... 20 ppm/˚C

AC Coupling (TBX-1329 only)
- Corner frequency ..... 0.072 Hz
- DC rejection capacity ..... 250 VDC

Wire resistance of cables ..... 0.21 Ω/m per conductor

Terminal Block	Accuracy[3] 15 to 35 ˚C	Accuracy[3] 0 to 15 and 35 to 55 ˚C	Repeatability[3]
TBX-1303[3]	0.5 ˚C	0.85 ˚C	0.35 ˚C
TBX-1328	0.5 ˚C	0.9 ˚C	0.2 ˚C

Cold-Junction Sensor (TBX-1303 and TBX-1328)

Accuracy and repeatability [3]

Cold-junction sensor output ..... 1.91 V (at 0 ˚C) to 0.58 V (at 55 ˚C)

Physical

Compatible DIN rails[6] ..... DIN EN 50 022 DIN EN 50 035

Screw terminal size
- TBX-1316 ..... 26-12 AWG
- Others ..... 26-14 AWG

Dimensions

- TBX-1303[4]. ..... 19.7 by 11.2 by 7.62 cm (7.8 by 4.4 by 3.0 in.)
- TBX-1316 ..... 300 by 200 by 80cm (11.8 by 7.9 by 3.2 in.)
- TBX-1325/1326/1328/1329[4] ..... 12.7 by 11.2 by 7.62 cm (5.0 by 4.4 by 3.0 in.)
- TBX-24F ..... 12.4 by 4.3 by 5.1 cm (4.9 by 1.7 by 2.0 in.)
- TBX-RM1 ..... 48.3 by 15.3 by 22.1 cm (19.0 by 6.0 by 8.7 in.)

Certification and Compliance

- SCXI-1320/1321/1326/1327/1328/1338 ..... 300 V, Cat II working voltage
- SCXI-1322/1324/1325 ..... 250 V, Cat II working voltage
- TBX-1316 ..... 1000 V, Cat III working voltage
- TBX-1328/1329 ..... 300 V, Cat II working voltage
- TBX-1325/1326 ..... 250 V, Cat II working voltage

European Compliance CE

- EMC ..... EN 61326 Group I Class A, 10m, Table 1 Immunity
- Safety ..... EN 61010-1

North American Compliance

- EMC ..... FCC Part 15 Class A using CISPR
- Safety (SCXI-1320/1321/1326/1327/1328/1338/SCXI-1322/1324/1325) ..... UL Listed to UL 3111-1 CAN/CSA C22.2 No. 1010.1
- Safety (TBX-1325/1326/1328/1329) ..... UL Listed to UL 3111-1 CAN/CSA C22.2 No. 1010.1

Australia & New Zealand Compliance

EMC (except TBX-1316) ..... AS/NZS 2064.1/2 (CISPR-11)

[1] Accuracy and repeatability include combined effects of sensor, circuitry, and thermal gradients between the sensor and any screw terminal. Thermal gradients for nonisothermal terminal blocks (SCXI-1300, SCXI-1320, SCXI-1321, SCXI-1322, and SCXI-1327) are assumed to be 0.4 ˚C.

[2] With SCXI-1102 module. With SCXI-1100 module, add error of 0.15 ˚C

[3] Accuracy and repeatability include combined effects of sensor, circuitry, and thermal gradients between the sensor and any screw terminal.

[4] Height dimension (76.2 cm) includes DIN-rail mounting and plastic cover.

[5] Accuracy and repeatability include combined effects of sensor, circuitry, and thermal gradients between the sensor and thermocouple connection.

[6] TBX-1316 is not DIN-rail mountable