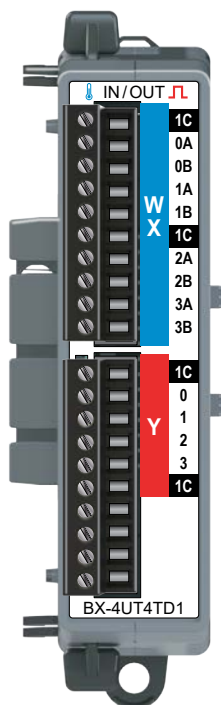# BX-4UT4TD1 Universal Temp. In/DC Sink Output

## BX-4UT4TD1
## $-04gic:

Universal Temperature Input/
DC Sinking Output Expansion Module
4-pt Universal Temperature Input
4-pt DC Sinking Output

**BX-RTB10** Terminal Blocks Included.
The **BX-RTB10-1** or **BX-RTB10-2**
(purchased separately) can also be used.

**NOTE:** This device does not
support **ZIP**Link Wiring Systems

## IMPORTANT!

### Hot-Swapping Information

Note: This device cannot be
Hot Swapped.

| Universal Temperature Input Specifications | |
|---|---|
| **Input Channels** | **4 Differential** |
| **Commons** | 1 |
| **Input Impedance** | >5MΩ |
| **Resolution** | 24-bit, 0.1°(C or F) See Data Range Specifications table |
| **All Channel Update Rate** | 1s max (4 thermocouples enabled) 700ms max (4RTD/NTX/mV enabled) |
| **Sample Duration Time** | 175ms |
| **Open Circuit Detection Time** | Within 5s |
| **Maximum Ratings** | -0.3 V to +5.3 V, <15mA |
| **Common Mode Range** | -0.3 V to +5.3 V |
| **Common Mode Rejection** | 100dB@DC, 130dB@60Hz |
| **Conversion Method** | Sigma-Delta, 24-bit |
| **Thermocouple Parameters** | |
| **Thermocouple Input Ranges** | Type J: −210° to 1200°C [−346° to 2192°F] Type K: −265° to 1372°C [−445° to 2502°F] Type E: −265° to 1000°C [−445° to 1832°F] Type N: −265° to 1300°C [−445° to 2372°F] Type R: −50° to 1768°C [−58° to 3214°F] Type S: −50° to 1768°C [−58° to 3214°F] Type B: 40° to 1820°C [104° to 3308°F] Type T: −265° to 400°C [−445° to 752°F] |
| **Linear Voltage Input Ranges** | −31.25 to 31.25 mVDC     −31.25 to 125mVDC −31.25 to 62.5 mVDC     0 to 1.0 VDC |
| **Cold Junction Compensation** | Automatic |
| **Thermocouple Linearization** | Automatic |
| **Maximum Inaccuracy– Thermocouple** | ±(0.2°C + 3% of °C reading) |
| **Maximum Inaccuracy–Voltage** | ±250µV |
| **RTD/Thermistor Parameters** | |
| **Input Ranges (RTD Types)** | 10, 50, 100, 200, 500, 1000Ω Pt Platinum RTD 0.00385 European Curve: −200° to 850°C [−328° to 1562°F] 120Ω Ni N120 Nickel RTD 0.00672 Curve: −80° to 260°C [−112° to 500°F] |
| **Thermistor Input Ranges** | 2.252 kΩ @ 25°C: −40° to 150°C [−40° to 302°F] 3 kΩ @ 25°C: −40° to 150°C [−40° to 302°F] 5 kΩ @ 25°C: −40° to 150°C [−40° to 302°F] 10k-AN Type 3 @ 25°C: −40° to 150°C [−40° to 302°F] 30 kΩ @ 25°C: −40° to 150°C [−40° to 302°F] |
| **RTD Excitation Current** | RTD 10, 100, 120, 200: 1mA RTD 500: 500µA RTD 1000: 250µA |
| **Thermistor Excitation Current** | NTC 2.252k, NTC 3k: 10µA NTC 5k, NTC 10k: 5µA NTC 30k: 1µA |
| **RTD/Thermistor Linearization** | Automatic |
| **Maximum Inaccuracy** | ±0.2°C |

| Module General Specifications | |
|---|---|
| **Weight** | 98g [3.5 oz] |
| **Heat Dissipation** | 2.5 W |
| **Backplane Power Consumption** | 2.5 W |
| **Agency Approvals** | UL 61010-2 File E185989, Canada and USA |
| **Software Version Required** | Do-more! Designer 2.7 or later |

# BX-4UT4TD1 Universal Temp. In/DC Sink Output

## Voltage Sinking Output Specifications

| | BX-4UT4TD1 |
|---|---|
| Outputs per Module | 4 |
| Commons | 1 |
| Output Type | Sinking |
| Maximum Current per Common | 2A |
| Nominal Voltage | 12–24VDC |
| Operating Voltage Range | 5–36VDC |
| Peak Voltage | 36VDC |
| Minimum Output Current | 0.1 mA @ 24VDC |
| Maximum Output Current | 0.5 A per output, no derating over temperature range |
| Maximum Inrush Current | 5A for 50ms |
| Maximum Leakage Current | 10µA |
| ON Voltage Drop | 0.05 VDC |
| Fuses, Overcurrent Protection | N/A |
| OFF-ON Response | <5ms |
| ON-OFF Response | <2ms |
| Status Indicators | Logic Side, Green |

## Data Range Specifications

| Thermocouple Selection | Temperature Range | Resolution | |
|---|---|---|---|
| | | WXn | RXn |
| Type J | −210 to 1200 °C<br>−346 to 2192 °F | Degrees x10 (One Implied Decimal)[1] | 24-Bit Floating[1] |
| Type K | −265 to 1372 °C<br>−445 to 2502 °F | | |
| Type E | −265 to 1000 °C<br>−445 to 1832 °F | | |
| Type R | −50 to 1768 °C<br>−58 to 3214 °F | | |
| Type S | −50 to 1768 °C<br>−58 to 3214 °F | | |
| Type B | 40 to 1820 °C<br>104 to 3308 °F [3] | | |
| Type T | −265 to 400 °C<br>−445 to 752 °F | | |
| Voltage Selection | Voltage Range | WXn[2] | RXn |
| −31.25 to 31.25 mVDC | Bipolar 31.25 mVDC | 0.95 µV per count (−32768 to 32767) | User Scaled |
| −31.25 to 62.5 mVDC | Bipolar 62.5 mVDC | 1.9 µV per count (−16384 to 32767) | |
| −31.25 to 125 mVDC | Bipolar 125 mVDC | 3.8 µV per count (−8192 to 32767) | |
| 0 to 1.0 VDC | Unipolar 1.0 VDC | 30.5 µV per count (0 to 32767) | |
| RTD Selection | Temperature Range | WXn | RXn |
| 10, 50, 100, 200, 500, 1000Ω Pt<br>Platinum RTD 0.00385 European Curve | −200 to 850 °C<br>−328 to 1562 °F | Degrees x10 (One Implied Decimal)[1] | 24-Bit Floating[1] |
| 120Ω Ni<br>N120 Nickel RTD 0.00672 Curve | −80 to 260 °C<br>−112 to 500 °F | | |
| Thermistor Selection | Temperature Range | WXn | RXn |
| Thermistor 2.252 kΩ @25°C | −40 to 150 °C<br>−40 to 302 °F | Degrees x10 (One Implied Decimal)[1] | 24-Bit Floating[1] |
| Thermistor 3kΩ @25°C | | | |
| Thermistor 5kΩ @25°C | | | |
| Thermistor 10k-AN Type 3 @25°C | | | |
| Thermistor 30kΩ @25°C | | | |

1. **Temperatures reported in rounded integer to WXn and as scaled floating point 24bits resolution to RXn.**
2. **Raw Counts = −32768 to 32767.**
3. **Maximum value displayed in WXn is 32767. RXn will display the full range of 3308.0.**

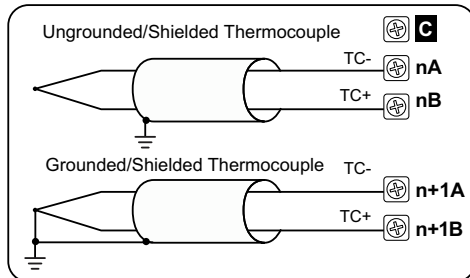# BX-4UT4TD1 Universal Temp. In/DC Sink Output
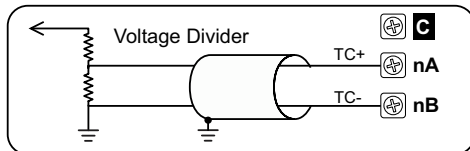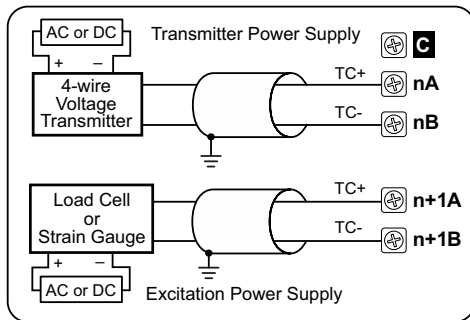
**Universal Temperature Input/DC Sink Output Wiring**
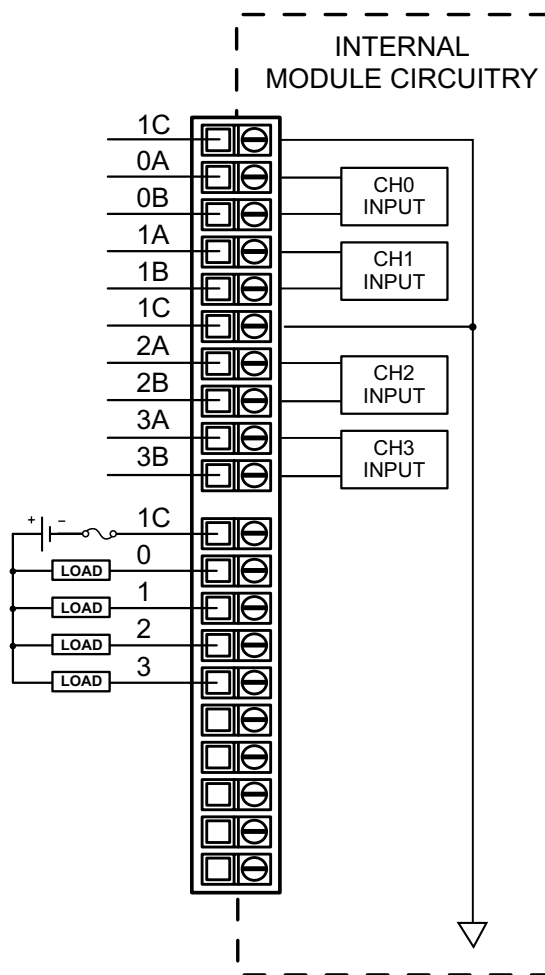
# BX-4UT4TD1 Universal Temp. In/DC Sink Output

## Universal Temperature Input Circuits

### Thermocouple and Voltage Sensors

**Ungrounded/Shielded Thermocouple**

TC-  **nA**
TC+  **nB**

**Grounded/Shielded Thermocouple**

TC-  **n+1A**
TC+  **n+1B**

**NOTE:** Thermocouple extension wire and proper thermocouple terminal blocks must be used to extend thermocouples. AutomationDirect thermocouple wire is recommended.
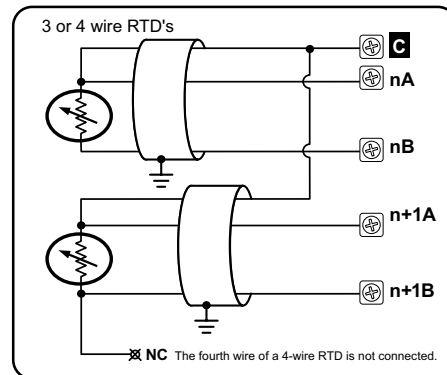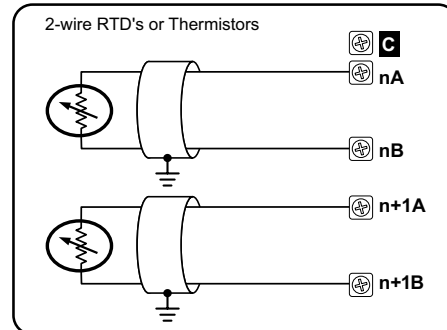
AC or DC  **Transmitter Power Supply**

4-wire Voltage Transmitter

TC+  **nA**
TC-  **nB**

Load Cell or Strain Gauge

TC+  **n+1A**
TC-  **n+1B**

AC or DC  **Excitation Power Supply**

**Voltage Divider**

TC+  **nA**
TC-  **nB**

**NOTE:** Shield should be connected only at one end, to ground at the source device.

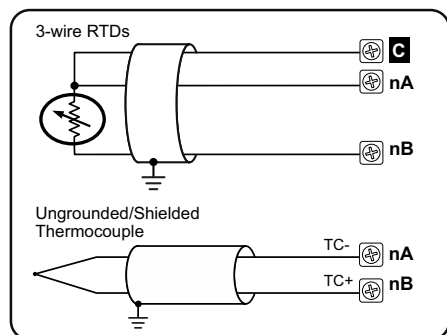For maximum accuracy: Jumper unused inputs.

TC+
TC-

### Resistive and Thermistor Sensors

**2-wire RTD's or Thermistors**

**C**
**nA**
**nB**

**n+1A**
**n+1B**

**3 or 4 wire RTD's**

**C**
**nA**
**nB**
**n+1A**
**n+1B**

✗ **NC** The fourth wire of a 4-wire RTD is not connected.

### Mixed Resistive and Thermocouple Sensors

**3-wire RTDs**

**C**
**nA**
**nB**

**Ungrounded/Shielded Thermocouple**

TC-  **nA**
TC+  **nB**

**Ungrounded/Shielded Thermocouple**

**C**
TC-  **nA**
TC+  **nB**

**3-wire RTDs**

**n+1A**
**n+1B**
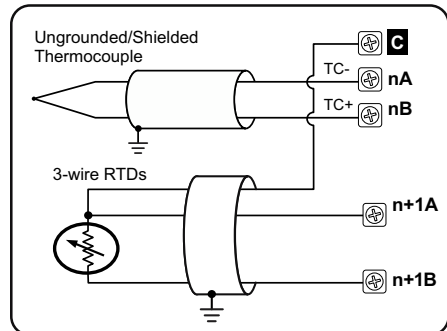
### Notes for maximum accuracy:

**1.** All wires to an RTD must be equal length and type. Refer to RTD manufacturer's recommendations.

**2.** Do not use cable shield as sensing wire.

**3.** When applicable, connect shield to RTD common only, otherwise connect to module common only. Do not connect shield to both ends.

**4.** Jumper unused inputs.

nA
nB
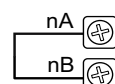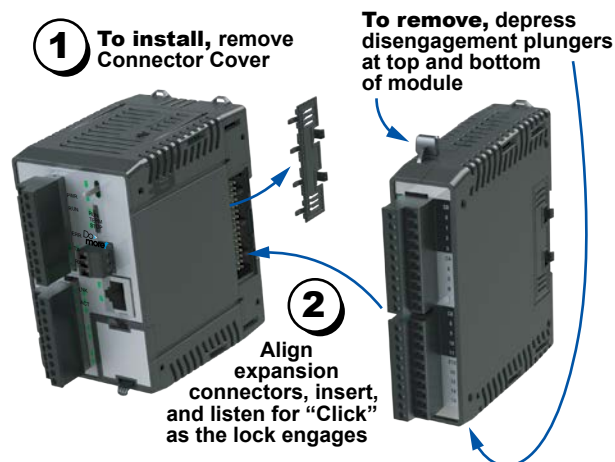
# BRX Analog Expansion Modules

## Overview

One of the unique features of the BRX platform is its ability to expand its capability to fit your application solution. One of the ways the BRX platform can do this is by using expansion modules that conveniently "snap-on" to the side of any BRX MPU. Once the expansion module has been snapped in place and is added to the project, it instantly adds I/O to the MPU with little to no additional setup required.

The analog expansion modules give you the ability to add analog I/O as needed and are identified as an analog input module, temperature input module, or analog output module. On the front panel of the analog I/O expansion modules, a color scheme and a symbol are used to denote the module type.

Analog modules are available with current inputs or outputs, unipolar/bipolar voltage inputs or outputs, thermocouple inputs, RTD inputs and thermistor inputs. Input/output combination modules are also available.

With the exception of temperature input modules, the modules ship without wiring terminals. This allows you to select the termination style that best fits your application. Several wiring options are available, including screw terminal connectors, spring clamp terminal connectors and pre-wired *ZIP*Link cable solutions.

**① To install,** remove Connector Cover

**To remove,** depress disengagement plungers at top and bottom of module

**②** **Align expansion connectors, insert, and listen for "Click" as the lock engages**

| Hot-Swapping Information |
|---|
| Note: This device cannot be Hot Swapped. |

## General Specifications

All BRX analog input and output modules and temperature input modules have the same general specifications listed in the table below.

| General Specifications | |
|---|---|
| *Storage Temperature* | −20° to 70°C [−4° to 158°F] |
| *Humidity* | 5% to 95% (non-condensing) |
| *Environmental Air* | No corrosive gases permitted |
| *Vibration* | IEC60068-2–6 (Test Fc) |
| *Shock* | IEC60068-2-27 (Test Ea) |
| *Enclosure Type* | Open Equipment |
| *Noise Immunity* | NEMA ICS3-304 |
| *EU Directive* | See the "EU Directive" topic in the BRX Help File |
| *Agency Approvals (unless otherwise noted on individual module specifications)* | UL 61010-1 and UL 61010-2-201 File E139594, Canada and USA<br>CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety) |

| Operating Temperature Range | | |
|---|---|---|
| *Operating Temperature* | 0° to 45°C [32° to 113°F] | 0° to 60°C [32° to 140°F] |
| *Module* | *Module Revision** | |
| **BX-08AD-1** | Rev A (Prior to May 2018) | Rev B (After May 2018) |
| **BX-08AD-2B** | | |
| **BX-04THM** | | |
| **BX-08DA-1** | | |
| **BX-08DA-2B** | Rev B (Prior to May 2018) | Rev C (After May 2018) |
| *All other Analog and Temperature Expansion Module part numbers* | N/A | Rev A (After May 2018) |

\* Module Revision can be found in the last letter (last or second-to-last character) of the module serial number.

## Dimensions

3.25" [82.6mm]

4.57" [116.2mm]

4.24" [107.8mm]

1.08" [27.5mm]

1.00" [25.4mm]

2X Ø #8 Thru all
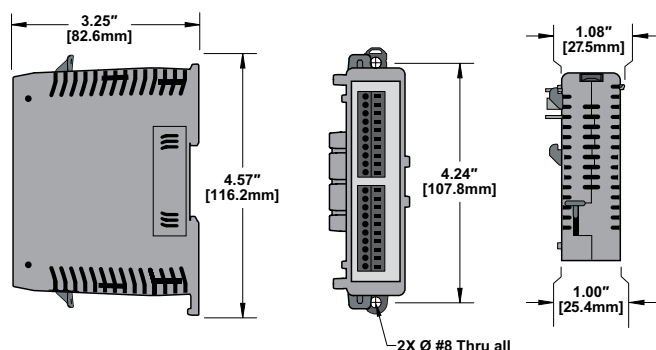
**NOTE:** When removing an expansion module, make sure there is room for the module to slide away from the system. Failure to do so will result in difficulty removing the module.

# BRX Analog Expansion Modules

## Analog Input Modules

Nine (9) analog input modules are available, with current or voltage inputs. Analog input module faceplates have a blue terminal bar to distinguish them as inputs, with symbols ⟋ or ◢ to signify current or voltage, respectively.
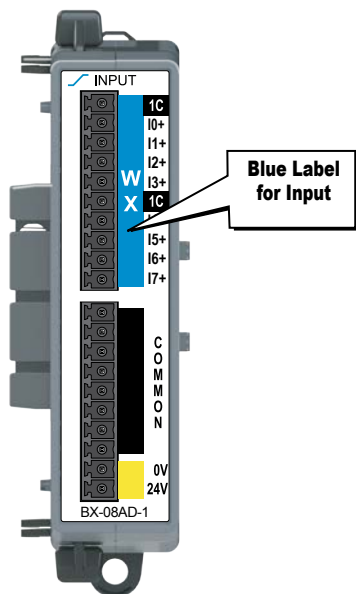
| Analog Input Modules | | | | |
|---|---|---|---|---|
| Part Number | Points | Input Type | Resolution | Price |
| BX-04ADM-1 | 4 | Current Sink 0–20 mA, 4–20 mA | 14-bit | $0127n: |
| BX-04AD-1 | 4 | Current Sink 0–20 mA, 4–20 mA | 16-bit | $0127o: |
| BX-08AD-1 | 8 | | | $0127p: |
| BX-16AD-1 | 16 | | | $;;03!t3: |
| BX-04AD-2B | 4 | Voltage ± 10VDC, ± 5VDC, 0–5 VDC, 0–10 VDC | 16-bit | $0289#: |
| BX-08AD-2B | 8 | | | $;0127t: |
| BX-16AD-2B | 16 | | | $;;03!t4: |
| BX-04AD-3 | 4 | Current Sink 0–20mA, 4–20mA Voltage ±10VDC, ±5VDC, 0–5VDC, 0–10VDC | 16-bit | $-04gi5: |
| BX-08AD-3 | 8 | | | $-04gi6: |

## Temperature Input Module

Six (6) temperature input modules are available, with thermocouple, RTD, and/or thermistor inputs. The thermocouple input modules can also be configured for millivolt-level voltage inputs, and the RTD input module can also be configured for resistance input. Temperature module faceplates have a blue terminal bar to distinguish them as inputs, and ⎇ symbol to signify temperature.
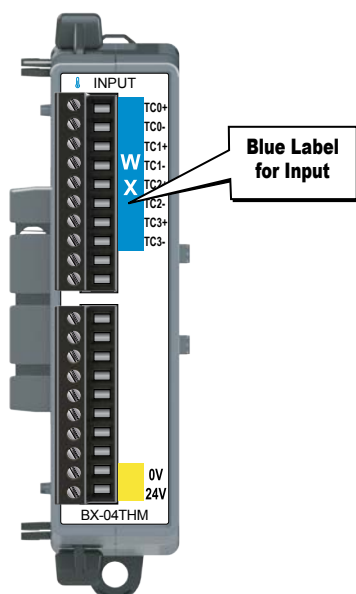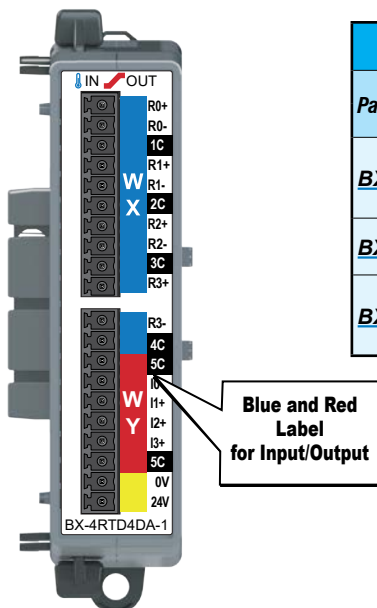
| Temperature Input Modules | | | |
|---|---|---|---|
| Part Number | Points | Input Type | Price |
| BX-04THM | 4 | Thermocouple | $0127?: |
| BX-08THM | 8 | Thermocouple | $;0289!: |
| BX-06RTD | 6 | RTD | $0289?: |
| BX-08NTC | 8 | Thermistor | $;0127,: |
| BX-04UT | 4 | Universal Temperature (Thermocouple, RTD, Thermistor supported) | $;-04gif: |
| BX-08UT | 6 | Universal Temperature (Thermocouple, RTD, Thermistor supported) | $-04gig: |

# BRX Analog Expansion Modules
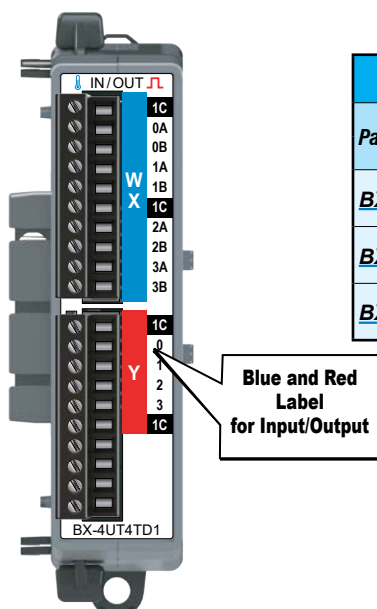
## Temperature/Analog Combo Module

Three (3) combination modules are available, with thermocouple, RTD or universal temperature inputs and current sourcing outputs. The thermocouple input modules can also be configured for millivolt-level voltage inputs, and the RTD input module can also be configured for resistance input. The Input/Output faceplate terminal bar is in blue and red, making it easy to distinguish between inputs and outputs, and the 🌡 and 〰 symbols signify temperature and current, respectively.

| Temperature Input / Analog Output Combo Modules | | | | | |
|---|---|---|---|---|---|
| **Part Number** | **Points** | | **Input Type** | **Output Type** | **Price** |
| | **Input** | **Output** | | | |
| **BX-4RTD4DA-1** | 4 | 4 | Resistance Temperature Detector (RTD) | Current Source 0–20mA, 4–20mA | $;;03!t5: |
| **BX-4THM4DA-1** | 4 | 4 | Thermocouple | Current Source 0–20mA, 4–20mA | $;;03!t6: |
| **BX-4UT4DA-3** | 4 | 4 | Universal Temperature | Current Source: 0–20mA, 4–20mA Voltage:±10VDC, ±5VDC, 0–5VDC, 0–10VDC | $-04gib: |

Blue and Red Label for Input/Output

## Temperature/Discrete Combo Module

Three (3) combination modules are available with universal temperature inputs and DC sinking, sourcing or relay outputs. The thermocouple inputs can also be configured for millivolt-level voltage inputs, and the RTD inputs can also be configured for resistance input. The Input/Output faceplate terminal bar is in blue and red, making it easy to distinguish between inputs and outputs, and the 🌡 and ⊓ symbols signify temperature and discrete signals, respectively.

| Temperature Input / Discrete Output Combo Modules | | | | | |
|---|---|---|---|---|---|
| **Part Number** | **Points** | | **Input Type** | **Output Type** | **Price** |
| | **Input** | **Output** | | | |
| **BX-4UT4TD1** | 4 | 4 | Universal Temperature | 12–24 VDC Sinking | $-04gic: |
| **BX-4UT4TD2** | 4 | 4 | | 12–24 VDC Sourcing | $-04gid: |
| **BX-4UT4TR** | 4 | 4 | | Relay Form A (SPST) | $-04gie: |

Blue and Red Label for Input/Output

# BRX Analog Expansion Modules

## Analog Output Modules

Six (6) analog output modules are available, in current and voltage outputs. Analog output module faceplates have a red terminal bar to distinguish them as outputs, with symbols ⌇ or ◢ to signify current or voltage, respectively.

**Red Label for Output**

| Analog Output Modules | | | |
|---|---|---|---|
| **Part Number** | **Points** | **Output Type** | **Price** |
| BX-04DA-1 | 4 | Current Source 0–20 mA, 4–20 mA | $0127v: |
| BX-08DA-1 | 8 | | $0127x: |
| BX-04DA-2B | 4 | Voltage ± 10VDC, ± 5VDC, 0–5 VDC, 0–10 VDC | $0127y: |
| BX-08DA-2B | 8 | | $0127z: |
| BX-04DA-3 | 4 | Current Source 0–20mA, 4–20mA | $;04gh,: |
| BX-08DA-3 | 8 | Voltage ±10VDC, ±5VDC, 0–5VDC, 0–10VDC | $-04gi0: |

## Analog Combo Input / Output Modules

Six (6) analog input/output combo modules are available with current or voltage inputs and outputs. The Input/Output faceplate terminal bar is in blue and red, making it easy to distinguish between inputs and outputs. Symbols ⌇ and ◢ signify current and voltage, respectively.
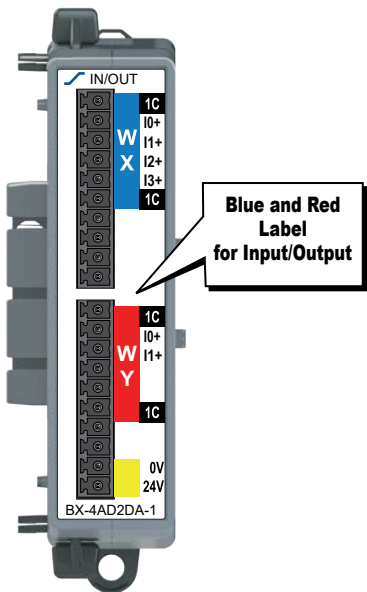
**Blue and Red Label for Input/Output**

| Analog Combo Input / Output Modules | | | | | |
|---|---|---|---|---|---|
| **Part Number** | **Points** | | **Input Type** | **Output Type** | **Price** |
| | **Input** | **Output** | | | |
| BX-2AD2DA-1 | 2 | 2 | Current Sink 0–20mA, 4–20mA | Current Source 0–20mA, 4–20mA | $;03!t0: |
| BX-4AD2DA-1 | 4 | 2 | | | $;03!s,: |
| BX-2AD2DA-2B | 2 | 2 | Voltage ±10VDC, ±5VDC, 0–5VDC, 0–10VDC | Voltage ±10VDC, ±5VDC, 0–5VDC, 0–10VDC | $;03!t2: |
| BX-4AD2DA-2B | 4 | 2 | | | $;03!t1: |
| BX-2AD2DA-3 | 2 | 2 | Current Source 0–20mA, 4–20mA | Current Source 0–20mA, 4–20mA | $-04gi7: |
| BX-4AD4DA-3 | 4 | 4 | Voltage ±10VDC, ±5VDC, 0–5VDC, 0–10VDC | Voltage ±10VDC, ±5VDC, 0–5VDC, 0–10VDC | $-04gi8: |

| Expansion Module Support by Controller | |
|---|---|
| **Controller Type** | **# Expansion Modules** |
| BX-DM1E-M | 8 |
| BX-DM1-10 | 8 |
| BX-DM1E-10 | 8 |
| BX-DM1-18 | 8 |
| BX-DM1E-18 | 8 |
| BX-DM1-36 | 8 |
| BX-DM1E-36 | 8 |
| BX-DMIO* | 8 |
| BX-EBC100* | 8 |
| BX-MBIO* | 8 |

\* Remote I/O controllers do not support Motion Control and Communications Modules.

# BRX Wiring Termination Options

## Terminal Block Connectors

The terminal block connectors are provided in kits of multiple connectors that are ordered as a single part number. There are 2 different types of kits to choose from; one kit for the five (5), eight (8) and 12-point discrete, and one

kit for the analog modules and 16-point discrete modules. The five (5), eight (8) and 12-point discrete module kits each have (3) 5-pin 5mm connectors. The 8-point modules will use only 2 of the 5-pin connectors.

The five (5) and 12-point modules will use all three connectors. The analog and 16-point digital module kits include (2) 10-pin 3.81 mm connectors.

## Terminal Block Connectors, 5, 8 and 12-Point Discrete Modules

**Terminal Block Kits for 5-point, 8-point and 12-point Expansion Modules**

BX-RTB08 (Kit - 3 pieces)

BX-RTB08-1 (Kit - 3 pieces)

BX-RTB08-2 (Kit - 3 pieces)

| Terminal Block Specifications 5-, 8- & 12-Point Type | | | |
|---|---|---|---|
| Part Number Single Block Set of 3 Blocks | BX-RTB05 BX-RTB08 | BX-RTB05-1 BX-RTB08-1 | BX-RTB05-2 BX-RTB08-2 |
| Price (Single Block) | $128#: | $1293: | $1299: |
| Price (Kit) | $128?: | $1295: | $129a: |
| Connector Type | Screw Type - 90-degree | Spring Clamp Type - 180-degree | Screw Type - 180-degree |
| Wire Exit | 180-degree | 180-degree | 180-degree |
| Pitch | 5.0 mm | 5.0 mm | 5.0 mm |
| Screw Size | M2.5 | N/A | M2.5 |
| Screw Torque Recommended | < 3.98 lb·in [0.45 N·m] | N/A | < 3.98 lb·in [0.45 N·m] |
| Screwdriver Blade Width | 3.5 mm | 3.5 mm | 3.5 mm |
| Wire Gauge (Single Wire) | 28–12 AWG | 28–14 AWG | 28–12 AWG |
| Wire Gauge (Dual Wire) | 28–16 AWG | 28–16 AWG (Dual Wire Ferrule Required) | 28–16 AWG |
| Wire Strip Length | 0.3 in [7.5 mm] | 0.37 in [9.5 mm] | 0.3 in [7.5 mm] |
| Equiv. Dinkle P/N | 5ESDV-05P-BK | 5ESDSR-05P-BK | 5ESDF-05P-BK |

## Terminal Block Connectors, Analog Modules and 16-Point Discrete Modules

**Terminal Block Kits for Analog and 16-point Discrete Expansion Modules**

BX-RTB10 (Kit - 2 pieces)

BX-RTB10-1 (Kit - 2 pieces)

BX-RTB10-2 (Kit - 2 pieces)

| Terminal Block Specifications 16-Point Type | | | |
|---|---|---|---|
| Part Number | BX-RTB10 | BX-RTB10-1 | BX-RTB10-2 |
| Price (Kit) | $;128,: | $1296: | $129b: |
| Connector Type | Screw Type 90-degree | Spring Clamp Type 180-degree | Screw Type 180-degree |
| Wire Exit | 180-degree | 180-degree | 180-degree |
| Pitch | 3.81 mm | 3.81 mm | 3.81 mm |
| Screw Size | M2 | N/A | M2 |
| Screw Torque Recommended | <1.77 lb·in [0.2 N·m] | N/A | <1.77 lb·in [0.2 N·m] |
| Screwdriver Blade Width | 2.5 mm | 2.5 mm | 2.5 mm |
| Wire Gauge (Single Wire) | 28–16 AWG | 26–18 AWG | 30–16 AWG |
| Wire Gauge (Dual Wire) | 28–18 AWG | 30–20 AWG (Dual Wire Ferrule Required) | 30–18 AWG |
| Wire Strip Length | 0.24 in [6mm] | 0.35 in [9mm] | 0.26 in [6.5 mm] |
| Equiv. Dinkle P/N | EC381V-10P-BK | ESC381V-10-BK | EC381F-10P-BK |

**NOTE:** BX-RTB10 terminal blocks are included with Temperature Input modules.