BX 10/10E Wiring

CHAPTER 3

In This Chapter...

BX 10/10E Micro PLC Unit (MPU) Overview

The BX 10/10E Micro PLC Unit (MPU) includes eight different versions. All have the same appearance and basic features. All units have six (6) discrete input points, and four (4) discrete output points built-in. Units with DC inputs have six (6) selectable high-speed inputs and units with DC outputs have two (2) selectable high-speed outputs. All MPUs can expand their capacity with the BRX Expansion Modules to allow for more flexibility while keeping control cost down. BX 10E units have an Ethernet port as well as an additional one (1) analog input and one (1) analog output built-in that are current/voltage selectable within the software.

The units ship without wiring terminals. This allows you to select the terminal block type that best fits your application. There are several wiring options available, including screw terminal connectors, spring clamp terminal connectors and prewired ***ZIP***Link cable solutions.

BX 10/10E MPUs can be divided into two distinct groups, BX 10 and BX 10E. The BX 10 MPUs have no built-in analog I/O or Ethernet port. The BX 10E MPUs have the same features of the BX 10, plus built-in analog I/O and an Ethernet port.

BX 10E
Micro PLC Unit (MPU)
Built-in Analog and Ethernet

BX 10
Micro PLC Unit (MPU)
No Built-in Analog or Ethernet

BX 10 MPUs General Specifications

BX 10
Micro PLC Unit (MPU)
No Built-in Analog or Ethernet

- 10 discrete I/O points: 6 inputs, 4 outputs
- No built-in analog I/O points
- All units are externally powered by a nominal 12–24 VDC
- Models with DC inputs:
  - have 6 high speed inputs up to 250kHz
  - accept 12–24 nominal voltages AC or DC
  - can be wired as sinking or sourcing.
- Models with AC inputs can accept 120–240 nominal voltages
- Output types available are DC sinking, DC sourcing, and relay
- Models with DC outputs have 2 high speed outputs up to 250kHz

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The following table shows the available MPUs with the BX 10 feature set.

BX 10 MPUs

Part Number	External Power	Discrete Input	Discrete Output	Expansion Modules
BX-DM1-10ED1-D	12–24 VDC	6 High-Speed, Sinking or Sourcing	2 High-Speed 2 Standard DC Sinking	8, as long as the MPU power budget is not exceeded
BX-DM1-10ED2-D			2 High-Speed 2 Standard DC Sourcing	
BX-DM1-10ER-D			4 Form A Relay	
BX-DM1-10AR-D		6 Standard AC		

BX 10E MPUs General Specifications

BX 10E
Micro PLC Unit (MPU)
Built-in Analog and Ethernet

- 10 discrete I/O points: 6 in/4 out
- All units are externally powered by a nominal 12–24 VDC
- Models with DC inputs:
  - have 6 high speed inputs up to 250kHz
  - accept 12–24 nominal voltages AC or DC
  - can be wired as sinking or sourcing.
- Models with AC inputs can accept 120–240 nominal voltages
- All units have a built-in RJ-45 Ethernet port, 10/100 Mbps
- All units have 1 analog input and 1 analog output (current/voltage software selectable)
- Output types available are DC sinking, DC sourcing, and relay
- Models with DC outputs have 2 high speed outputs up to 250kHz
- Support for up to 8 additional Expansion Modules as long as the power budget is not exceeded.

The following table shows the available MPUs with the BX 10E feature set.

BX 10E MPUs

Part Number	External Power	Discrete Inputs	Discrete Output	Analog*		Expansion Modules
				Input	Output	
BX-DM1E-10ED13-D	12–24 VDC	6 High-Speed, Sinking or Sourcing	2 High-Speed 2 Standard DC Sinking	1 Current or Voltage	1 Current or Voltage	8, as long as the MPU power budget is not exceeded
BX-DM1E-10ED23-D			2 High-Speed 2 Standard DC Sourcing			
BX-DM1E-10ER3-D			4 Form A Relay			
BX-DM1E-10AR3-D		6 Standard AC				

** Analog can be current or voltage software selectable per channel.*

BX 10/10E Wiring Termination Selection

The BX 10/10E MPUs ship without wiring terminals. This allows you to select the terminal block type that best fits your application. There are several wiring options available, including removable screw terminal connectors, removable spring clamp terminal connectors and prewired ***ZIP***Link cable solutions.

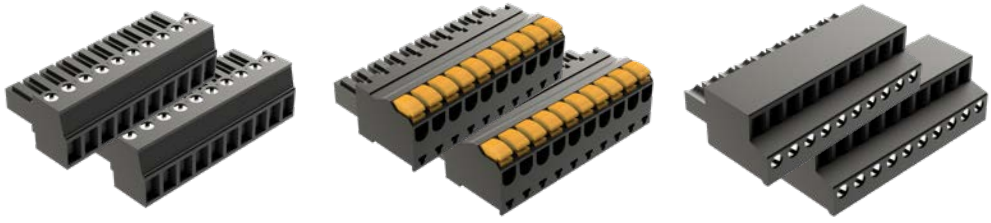
Terminal Block Connectors

The terminal block connectors are provided in kits and can be easily ordered as a single part number to receive all the terminal block connectors needed. Each kit for the BX 10/10E MPU comes with two (2) 10-pin, 3.8 mm terminal blocks. On the BX 10/10E MPUs the terminals are organized into groups consisting of 3 inputs with an isolated common and 2 outputs with an isolated common, e.g., Inputs X0-X2 are in a group with their common terminal.

The terminal block connector kit part numbers and connector specifications are listed in the table below.

Terminal Block Connector Specifications

Kit Part Number	BX-RTB10	BX-RTB10-1	BX-RTB10-2
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
Recommended Screw Torque	<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	28–18 AWG	30–16 AWG
Wire Gauge (Dual Wire)	28–16 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 part #	EC381V-10P-BK	ESC381V-10-BK	EC381F-10P-BK



BX-RTB10 BX-RTB10-1 BX-RTB10-2

NOTE: *For replacement terminal blocks, the appropriate part number in the table above should be ordered.*

*ZIP*Link Prewired Cable Solutions

*ZIP*Links eliminate the normally tedious process of wiring between devices by utilizing prewired cables and DIN rail mount connector modules. It's as simple as plugging in a cable connector at either end or terminating wires at only one end. Prewired cables keep installation clean and efficient, using less space at a fraction of the cost of standard terminal blocks. *ZIP*Link prewired cables can connect directly to a *ZIP*Link remote terminal block module or with the pigtail option they can allow for a convenient solution to wire the BRX platform to 3rd party devices. For the BX 10/10E MPUs, one cable and one feedthrough module is needed to connect to onboard wiring termination points. There are two feedthrough module options available, the ZL-RTB20 and the ZL-RTB20-1. The ZL-RTB20 is a standard feedthrough terminal module and the ZL-RTB20-1 is a compact feedthrough terminal block module and has a compact footprint which takes up less space in the control cabinet.

The *ZIP*Link system options for the BX 10/10E MPUs are listed in the table below.

BX 10/10E *ZIP*Link Selector

MPU Part Number	Component	Module Part No.	Cable Part No.*
BX-DM1-10ED1-D	Feedthrough	ZL-RTB20 (Standard) OR ZL-RTB20-1 (Compact)	ZL-BX-CBL20 ZL-BX-CBL20-1 ZL-BX-CBL20-2
BX-DM1-10ED2-D			
BX-DM1-10ER-D			
BX-DM1-10AR-D			
BX-DM1E-10ED13-D			
BX-DM1E-10ED23-D			
BX-DM1E-10ER3-D			
BX-DM1E-10AR3-D			

** Select the cable length: Blank = 0.5 m, -1 = 1.0 m, -2 = 2.0 m.*
Available pigtail cables: ZL-BX-CBL20-1P = 1.0 m, ZL-BX-CBL20-2P = 2.0 m.

*ZIP*Link Prewired Cables

Custom molded *ZIP*Link prewired cables allow for fast and easy connection of field wiring and remote I/O to the BRX platform. The prewired cables are available in 0.5 meter, 1 meter and 2 meter lengths. Pigtail cables are used to connect the BRX platform directly to third-party devices, lowering your wiring cost and time. The pigtail cables are available in 1 meter and 2 meter lengths.

ZL-BX-CBL20
***ZIP*Link Prewired Cable**

ZL-BX-CBL20-1P
***ZIP*Link Pigtail Cable**

*ZIP*Link Remote Feedthrough Modules

Feedthrough modules provide low-cost and compact field wiring screw termination solutions for quickly connecting with the BRX platform. There are 2 modules available for use with the BRX platform. The ZL-RTB20 and the ZL-RTB20-1. The ZL-RTB20 is a standard 2 row, 20-pin, DIN rail mountable feedthrough module. The ZL-RTB20-1 is a compact 3 row, 24-pin DIN rail mountable feedthrough module with a smaller footprint design.

The *ZIP*Link remote feedthrough module specifications are listed in the table below.

*ZIP*Link Module Specifications		
Part Number	**ZL-RTB20 (Maximum of 1 Needed)**	**ZL-RTB20-1 (Maximum of 1 Needed)**
Number of positions	20 screw terminals, 2 rows	24 screw terminals, 3 rows
Screwdriver Width	1/8 in (3.8 mm) maximum	
Screw Torque	4.4 lb·in (0.5 N·m)	

ZL-RTB20

ZL-RTB20-1

*ZIP*Link System Examples

BX 10E MPU with *ZIP*Link System pre-wired cable and feedthrough module.

BX 10E with *ZIP*Link Pigtail Cable ZL-BX-CBL20-1P

BX 10 Micro PLC Units (MPUs)

BX-DM1-10ED1-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - sinking/sourcing; rated for 12–24 VAC/VDC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common each.
- Four (4) discrete outputs - sinking; rated at 12–24 VDC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common each.

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply.

WARNING: No analog I/O is included on this unit. The three (3) terminals between the power supply and the inputs are not used. These terminals are not internally connected. DO NOT CONNECT ANYTHING TO THESE TERMINALS!

BX-DM1-10ED1-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

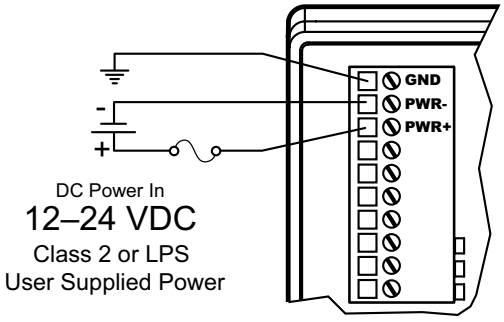
BX-DM1-10ED1-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	7.4 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1-10ED1-D Wiring, Continued

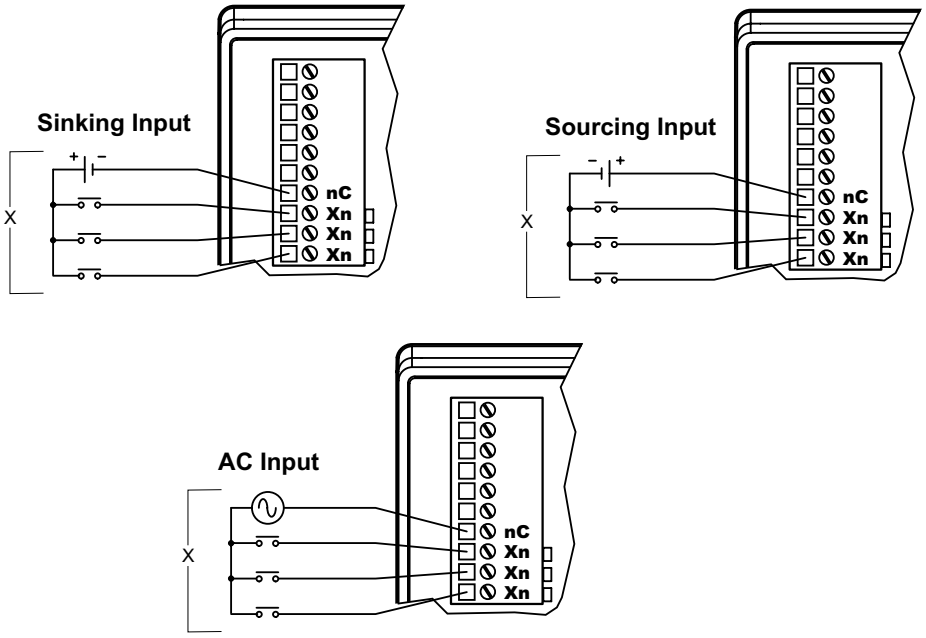
Discrete Input Specifications

Discrete Input Specifications			
Input Type		Sink/Source	
Total Inputs per Module		6	
Commons		2 (3 points/common) Isolated	
Nominal Voltage Range		12–24 VAC/VDC	
Input Voltage Range		9–30 VAC/VDC	
Maximum Voltage		30 VAC/VDC	
DC Frequency		0–250 kHz - High-speed	
Minimum Pulse Width		0.5 µs - High-speed	
AC Frequency		47–63 Hz[2]	
Input Impedance		3kΩ @ 24VDC	
Input Current (typical)		6mA @ 24 VAC/VDC	
Maximum Input Current		12mA @ 30 VAC/VDC	
ON Voltage Level		> 9.0 VAC/VDC	
OFF Voltage Level		< 2.0 VAC/VDC	
Maximum OFF Current		2.0 mA	
Status Indicators		Logic Side, Green	
Input Details			
Input Type		High-Speed DC	Standard[1]
Location		X0...X5	
OFF to ON Response	DC	< 2µs	
	AC	–	10ms[2]
ON to OFF Response	DC	< 2µs	
	AC	–	10ms[2]
Maximum Switching Frequency	DC	250kHz	
	AC	~ 30Hz	

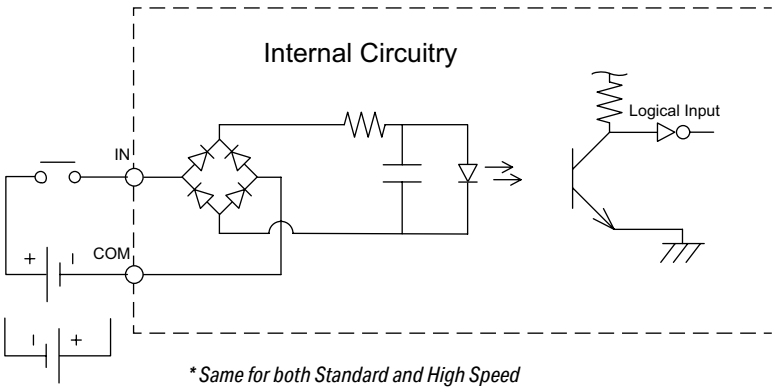
1. *All Inputs may be used as standard inputs or high speed inputs independently.*
2. *60Hz to 240Hz filter should be set in the software when using an AC line signal.*

BX-DM1-10ED1-D Wiring, Continued

Discrete Input Connection Options



Discrete Input Internal Circuitry *



** Same for both Standard and High Speed*

BX-DM1-10ED1-D Wiring, Continued

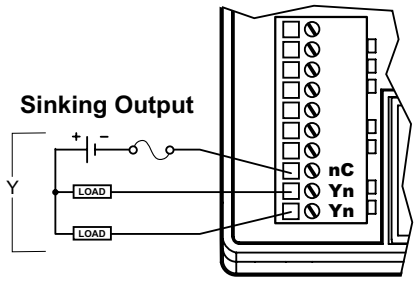
Discrete Output Specifications

Discrete Output Specifications		
Output Type	Sinking	
Total Outputs per Module	4	
Commons	2 (2 points/common) Isolated	
Maximum Current per Common	1A	
Nominal Voltage Range	12–24 VDC	
Operating Voltage Range	5–36 VDC	
Maximum 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	
Status Indicators	Logic Side, Green	
Output Details		
Output Type	High-Speed	Standard[1]
Location	Y0...Y1	Y2...Y3
OFF to ON Response	< 2µs	< 5ms
ON to OFF Response	< 2µs	< 2ms
Maximum Switching Frequency	1m cable - 250kHz 10m cable - 100kHz	~ 100Hz
Overcurrent, Short Circuit Protection and Short to Ground	Current limit by Common Group, self-resetting	N/A
Overcurrent Trip Level[2]	Between 4A and 8A	N/A
Fuse Type	User-supplied external fuse	

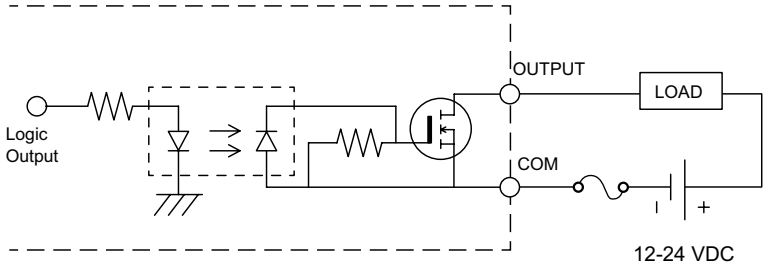
1. *All outputs may be used as standard outputs. Only the first 2 outputs (Y0...Y1) are capable of high-speed DC operation.*
2. *When the high-speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1-10ED1-D Wiring, Continued

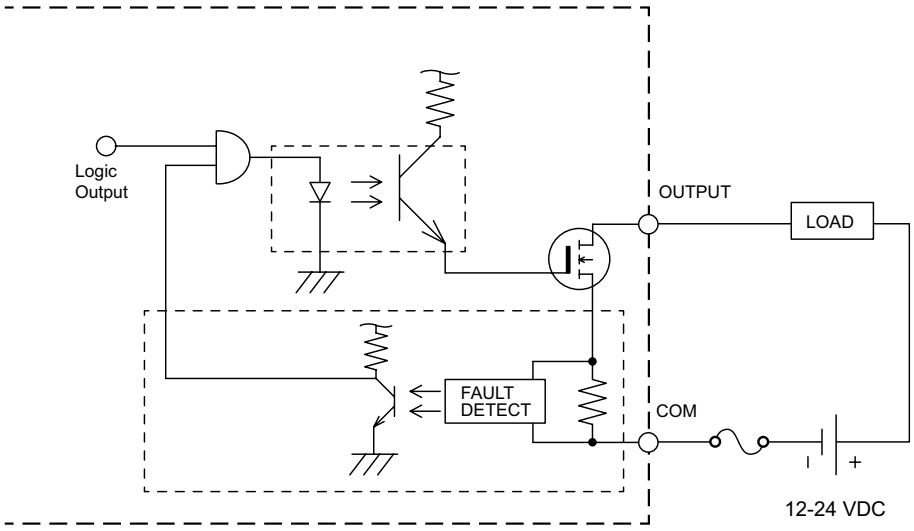
Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



Discrete High-Speed Output Internal Circuitry



NOTE: *When the high speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1-10ED2-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - sinking/sourcing; rated for 12–24 VAC/VDC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - sourcing; rated at 12–24 VDC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common in each group.

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply.

WARNING: No analog I/O is included on this unit. The three (3) terminals between the power supply and the inputs are not used. These terminals are not internally connected. DO NOT CONNECT ANYTHING TO THESE TERMINALS!

BX-DM1-10ED2-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

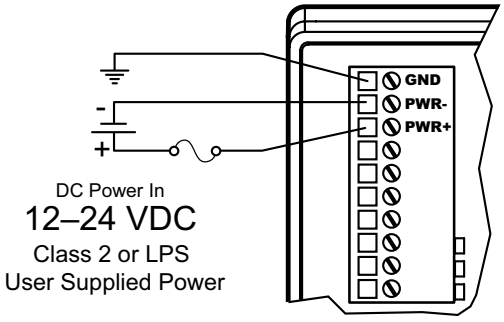
BX-DM1-10ED2-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	7.4 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1-10ED2-D Wiring, Continued

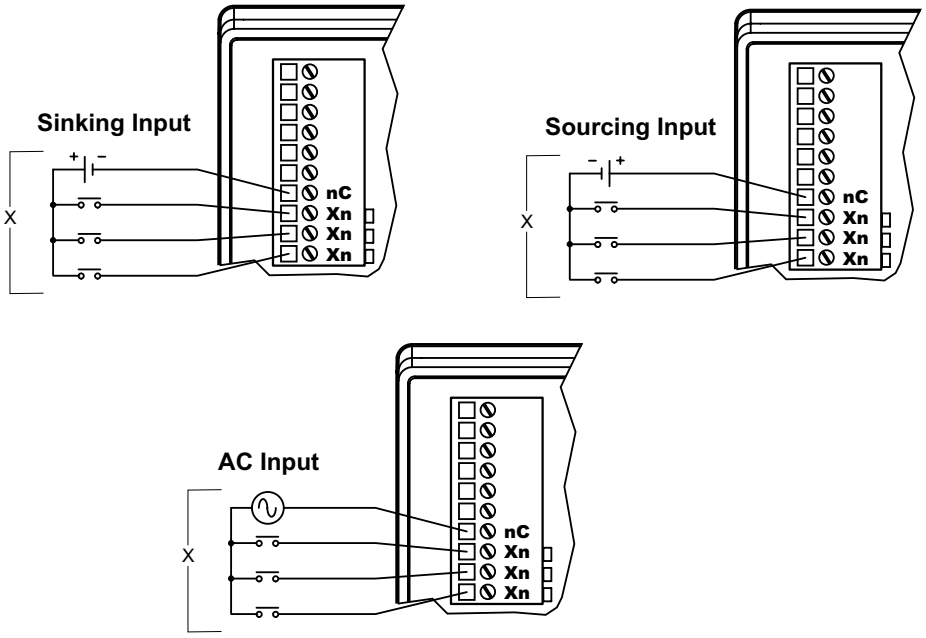
Discrete Input Specifications

Discrete Input Specifications			
Input Type		Sink/Source	
Total Inputs per Module		6	
Commons		2 (3 points/common) Isolated	
Nominal Voltage Range		12–24 VAC/VDC	
Input Voltage Range		9–30 VAC/VDC	
Maximum Voltage		30 VAC/VDC	
DC Frequency		0–250 kHz - High-speed	
Minimum Pulse Width		0.5 µs - High-speed	
AC Frequency		47–63 Hz[2]	
Input Impedance		3kΩ @ 24VDC	
Input Current (typical)		6mA @ 24 VAC/VDC	
Maximum Input Current		12mA @ 30 VAC/VDC	
ON Voltage Level		> 9.0 VAC/VDC	
OFF Voltage Level		< 2.0 VAC/VDC	
Maximum OFF Current		2.0 mA	
Status Indicators		Logic Side, Green	
Input Details			
Input Type		High-Speed DC	Standard[1]
Location		X0...X5	
OFF to ON Response	DC	< 2µs	
	AC	–	10ms[2]
ON to OFF Response	DC	< 2µs	
	AC	–	10ms[2]
Maximum Switching Frequency	DC	250kHz	
	AC	~ 30Hz	

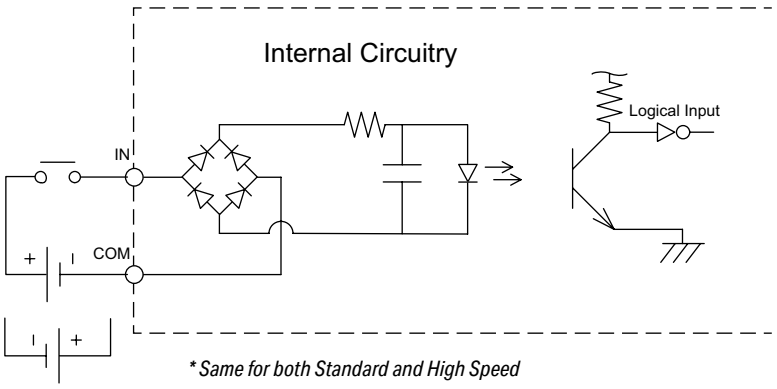
1. *All Inputs may be used as standard inputs or high speed inputs independently.*
2. *60Hz to 240Hz filter should be set in the software when using an AC line signal.*

BX-DM1-10ED2-D Wiring, Continued

Discrete Input Connection Options



Discrete Input Internal Circuitry *



** Same for both Standard and High Speed*

BX-DM1-10ED2-D Wiring, Continued

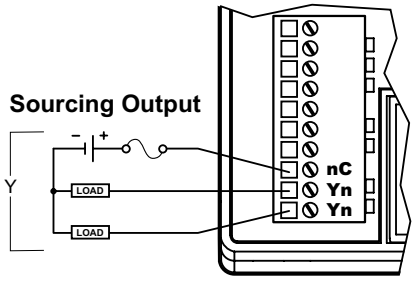
Discrete Output Specifications

Discrete Output Specifications		
Output Type	Sourcing	
Total Outputs per Module	4	
Commons	2 (2 points/common) Isolated	
Maximum Current per Common	1A	
Nominal Voltage Range	12–24 VDC	
Operating Voltage Range	5–36 VDC	
Maximum 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	
Status Indicators	Logic Side, Green	
Output Details		
Output Type	High-Speed	Standard[1]
Location	Y0...Y1	Y2...Y3
OFF to ON Response	< 2µs	< 5ms
ON to OFF Response	< 2µs	< 2ms
Maximum Switching Frequency	1m cable - 250kHz 10m cable - 100kHz	~ 100Hz
Overcurrent, Short Circuit Protection and Short to Ground	Current limit by Common Group, self-resetting	N/A
Overcurrent Trip Level[2]	Between 4A and 8A	N/A
Fuse Type	User-supplied external fuse	

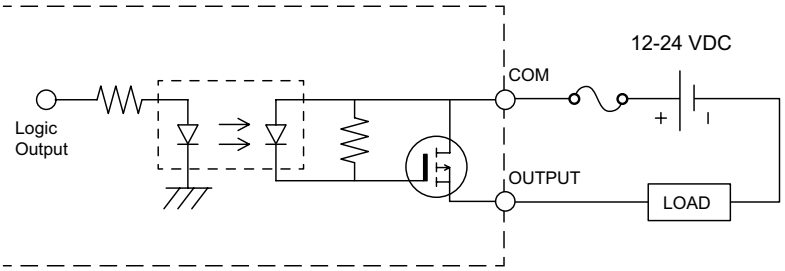
1. *All outputs may be used as standard outputs. Only the first 2 outputs (Y0...Y1) are capable of high-speed DC operation.*
2. *When the high-speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1-10ED2-D Wiring, Continued

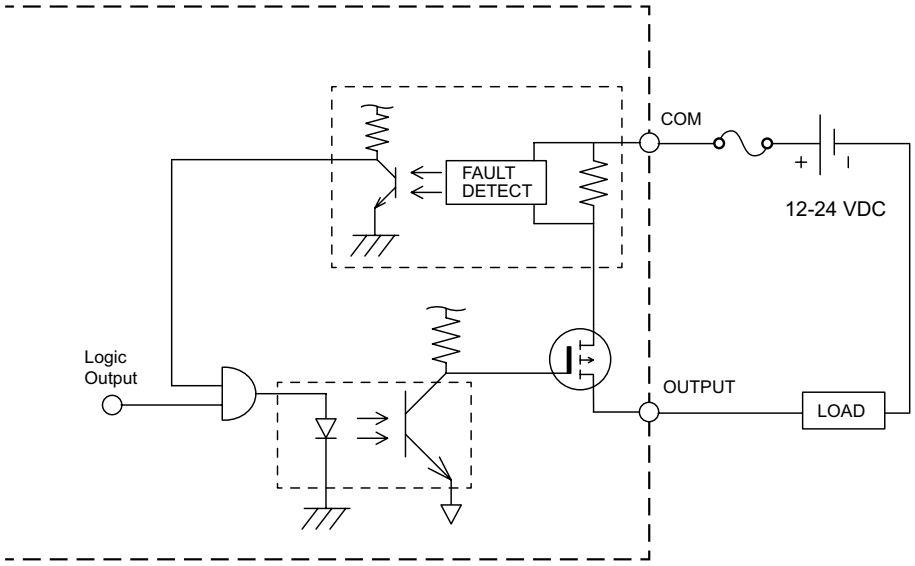
Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



Discrete High-Speed Output Internal Circuitry



NOTE: *When the high speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1-10ER-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - sinking/sourcing; rated for 12–24 VAC/VDC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - Form A Relay (SPST); rated 12–48 VDC/ 24–240 VAC. They are located along the front left of the unit. The outputs are organized into groups of three terminals consisting of two outputs and an isolated common in each group.

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply.

WARNING: No analog I/O is included on this unit. The three (3) terminals between the power supply and the inputs are not used. These terminals are not internally connected. DO NOT CONNECT ANYTHING TO THESE TERMINALS!

BX-DM1-10ER-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

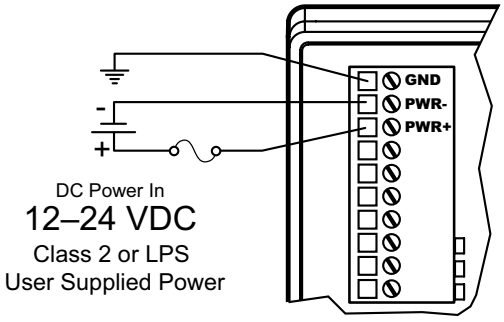
BX-DM1-10ER-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	8.9 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1-10ER-D Wiring, Continued

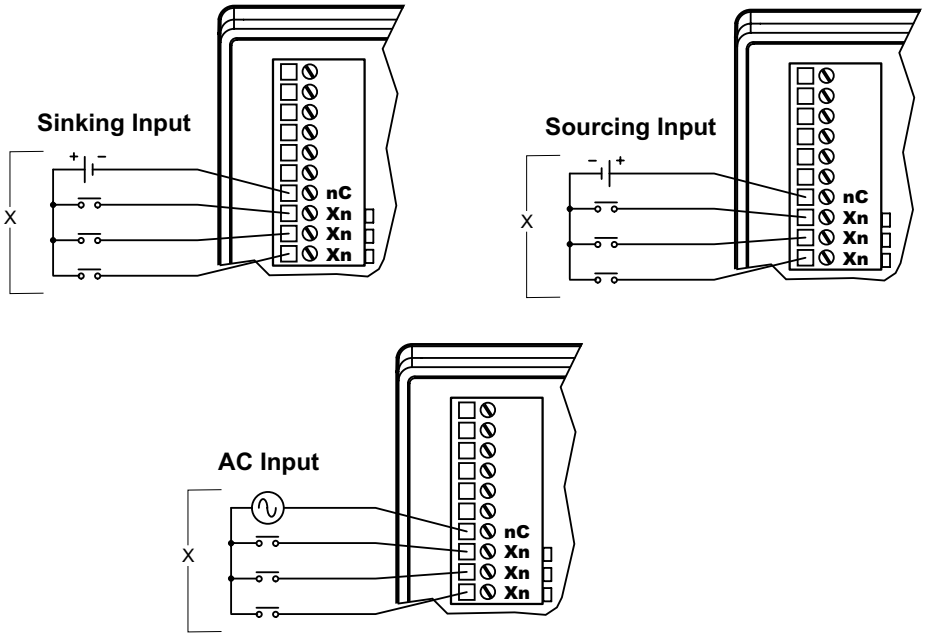
Discrete Input Specifications

Discrete Input Specifications			
Input Type		Sink/Source	
Total Inputs per Module		6	
Commons		2 (3 points/common) Isolated	
Nominal Voltage Range		12–24 VAC/VDC	
Input Voltage Range		9–30 VAC/VDC	
Maximum Voltage		30 VAC/VDC	
DC Frequency		0–250 kHz - High-speed	
Minimum Pulse Width		0.5 µs - High-speed	
AC Frequency		47–63 Hz[2]	
Input Impedance		3kΩ @ 24VDC	
Input Current (typical)		6mA @ 24 VAC/VDC	
Maximum Input Current		12mA @ 30 VAC/VDC	
ON Voltage Level		> 9.0 VAC/VDC	
OFF Voltage Level		< 2.0 VAC/VDC	
Maximum OFF Current		2.0 mA	
Status Indicators		Logic Side, Green	
Input Details			
Input Type		High-Speed DC	Standard[1]
Location		X0...X5	
OFF to ON Response	DC	< 2µs	
	AC	–	10ms[2]
ON to OFF Response	DC	< 2µs	
	AC	–	10ms[2]
Maximum Switching Frequency	DC	250kHz	
	AC	~ 30Hz	

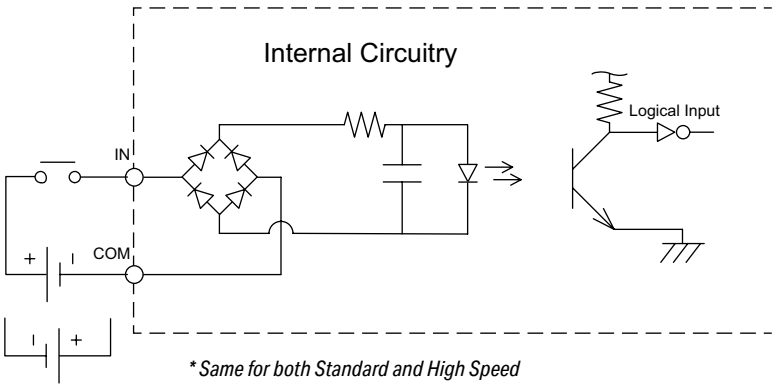
1. *All Inputs may be used as standard inputs or high speed inputs independently.*
2. *60Hz to 240Hz filter should be set in the software when using an AC line signal.*

BX-DM1-10ER-D Wiring, Continued

Discrete Input Connection Options



Discrete Input Internal Circuitry *



*Same for both Standard and High Speed

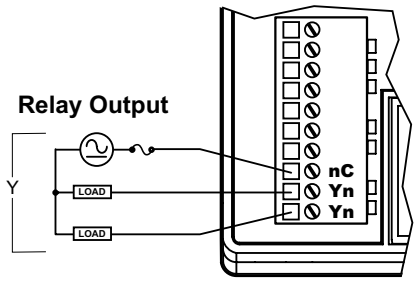
BX-DM1-10ER-D Wiring, Continued

Discrete Output Specifications

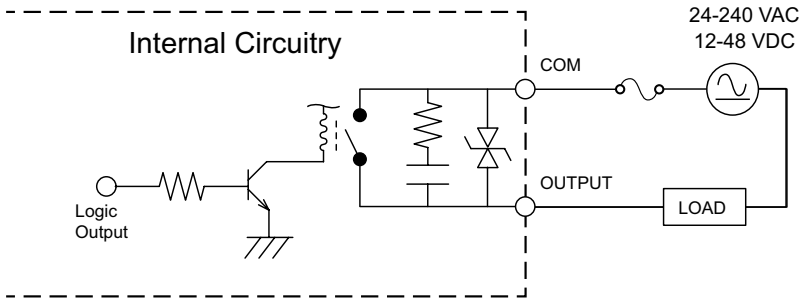
Discrete Output Specifications	
Output Type	Relay Form A (SPST)
Total Outputs per Module	4
Commons	2 (2 points/common) Isolated
Maximum Current per Common	4A
Nominal Voltage Range	12–48 VDC 24–240 VAC
Operating Voltage Range	5–60 VDC 5–264 VAC
Maximum Voltage	60VDC 264VAC
Minimum Output Current	0.1 mA @ 24VDC 0.1 mA @ 24VAC
Maximum Output Current	2A
Maximum Inrush Current	5A for 50ms
Maximum Leakage Current	1µA (DC), 300µA (AC) due to RC snubber circuit
ON Voltage Drop	0.2 V Max
Status Indicators	Logic Side, Green
Output Details	
Output Type	Standard
Location	Y0...Y3
ON-OFF Response	<10ms
OFF-ON Response	<10ms
Maximum Switching Frequency	10Hz
Relay Cycle Life Mechanical Endurance Electrical Endurance	 5 million operations 120,000 operations
Fuse Type	User-supplied external fuse

BX-DM1-10ER-D Wiring, Continued

Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



BX-DM1-10AR-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - AC rated for 120–240 VAC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - Form A Relay (SPST); rated 12–48 VDC/ 24–240 VAC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common in each group.

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply.

WARNING: No analog I/O is included on this unit. The three (3) terminals between the power supply and the inputs are not used. These terminals are not internally connected. DO NOT CONNECT ANYTHING TO THESE TERMINALS!

BX-DM1-10AR-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

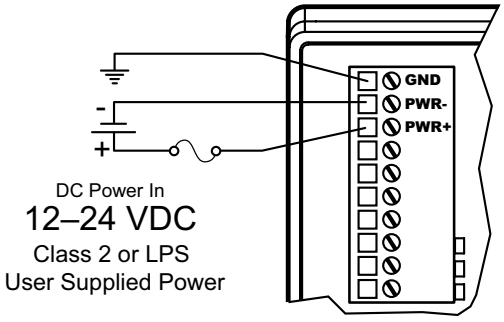
BX-DM1-10AR-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	8.7 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



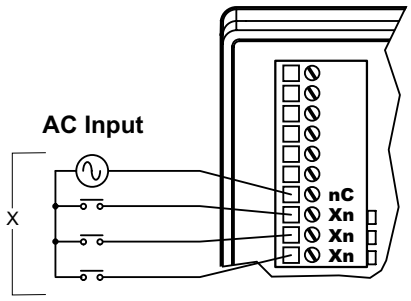
WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1-10AR-D Wiring, Continued

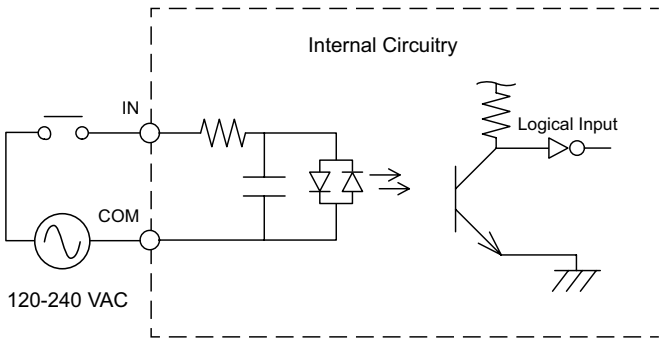
Discrete Input Specifications

Discrete Input Specifications	
Input Type	AC
Total Inputs per Module	6
Commons	2 (3 points/common) Isolated
Nominal Voltage Range	120–240 VAC
Input Voltage Range	85–264 VAC
Maximum Voltage	264VAC RMS
AC Frequency	47–63 Hz
Input Impedance	15kΩ
Input Current (typical)	9mA @ 120VAC, 13mA @ 220VAC
Maximum Input Current	14mA @ 120VAC, 20mA @ 220VAC
ON Voltage Level	> 85VAC
OFF Voltage Level	< 40VAC
Maximum OFF Current	2.5 mA
Status Indicators	Logic Side, Green
Input Details	
Input Type	Standard
Location	X0...X5
OFF - ON Response	10ms
ON - OFF Response	10ms
Maximum Switching Frequency	~ 30Hz

Discrete Input Connection Options



Discrete Input Internal Circuitry



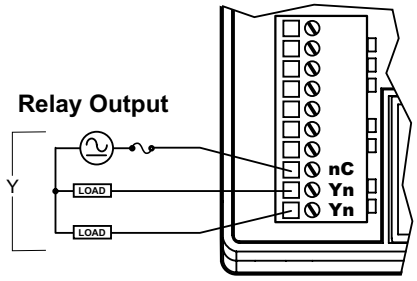
BX-DM1-10AR-D Wiring, Continued

Discrete Output Specifications

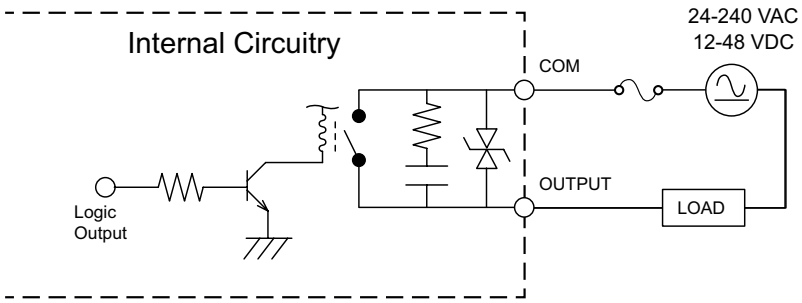
Discrete Output Specifications	
Output Type	Relay Form A (SPST)
Total Outputs per Module	4
Commons	2 (2 points/common) Isolated
Maximum Current per Common	4A
Nominal Voltage Range	12–48 VDC 24–240 VAC
Operating Voltage Range	5–60 VDC 5–264 VAC
Maximum Voltage	60VDC 264VAC
Minimum Output Current	0.1 mA @ 24VDC 0.1 mA @ 24VAC
Maximum Output Current	2A
Maximum Inrush Current	5A for 50ms
Maximum Leakage Current	1µA (DC), 300µA (AC) due to RC snubber circuit
ON Voltage Drop	0.2 V Max
Status Indicators	Logic Side, Green
Output Details	
Output Type	Standard
Location	Y0...Y3
ON-OFF Response	<10ms
OFF-ON Response	<10ms
Maximum Switching Frequency	10Hz
Relay Cycle Life Mechanical Endurance Electrical Endurance	 5 million operations 120,000 operations
Fuse Type	User-supplied external fuse

BX-DM1-10AR-D Wiring, Continued

Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



BX 10E Micro PLC Units (MPUs)

BX-DM1E-10ED13-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - sinking/sourcing; rated for 12–24 VAC/VDC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - sinking; rated at 12–24 VDC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common in each group.
- One (1) analog input and one (1) analog output. The analog inputs and outputs are located along the front left side of the unit. The analog inputs and outputs are grouped together on 3 terminals consisting of 1 analog input, 1 analog output and a shared analog common.
  - current or voltage selectable through software
  - 16-bit resolution @ ±10V, ±20mA
  - current signal ranges of 4–20 mA, ±20 mA
  - voltage signal ranges of 0–5 VDC, 0–10 VDC, ±5VDC, ±10VDC

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply.

BX-DM1E-10ED13-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

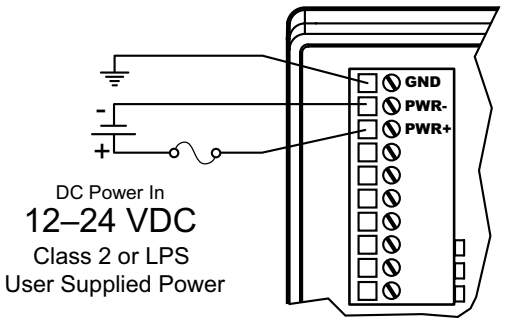
BX-DM1E-10ED13-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	8.7 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1E-10ED13-D Wiring, Continued

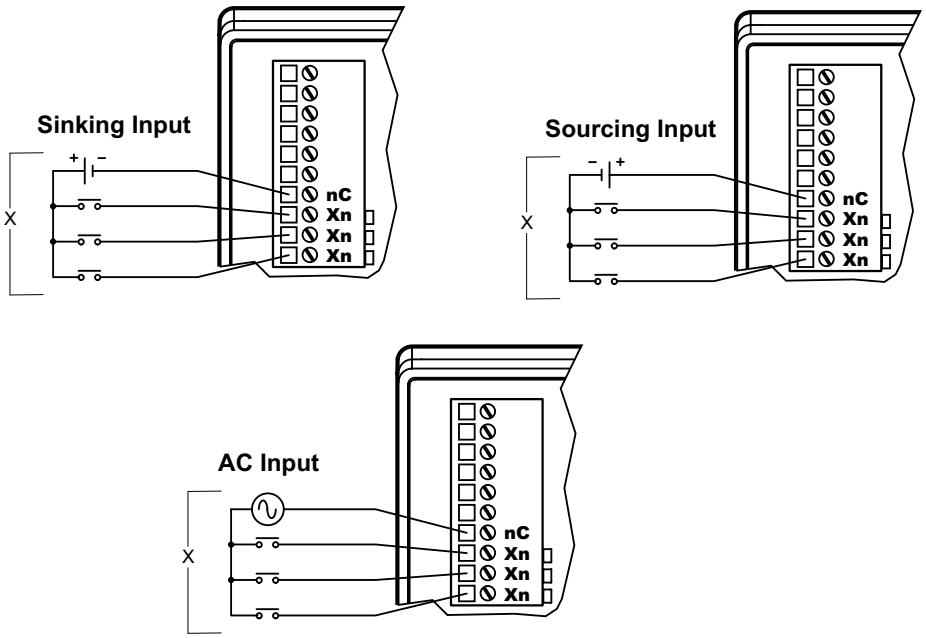
Discrete Input Specifications

Discrete Input Specifications			
Input Type		Sink/Source	
Total Inputs per Module		6	
Commons		2 (3 points/common) Isolated	
Nominal Voltage Range		12–24 VAC/VDC	
Input Voltage Range		9–30 VAC/VDC	
Maximum Voltage		30 VAC/VDC	
DC Frequency		0–250 kHz - High-speed	
Minimum Pulse Width		0.5 µs - High-speed	
AC Frequency		47–63 Hz[2]	
Input Impedance		3kΩ @ 24VDC	
Input Current (typical)		6mA @ 24 VAC/VDC	
Maximum Input Current		12mA @ 30 VAC/VDC	
ON Voltage Level		> 9.0 VAC/VDC	
OFF Voltage Level		< 2.0 VAC/VDC	
Maximum OFF Current		2.0 mA	
Status Indicators		Logic Side, Green	
Input Details			
Input Type		High-Speed DC	Standard[1]
Location		X0...X5	
OFF to ON Response	DC	< 2µs	
	AC	–	10ms[2]
ON to OFF Response	DC	< 2µs	
	AC	–	10ms[2]
Maximum Switching Frequency	DC	250kHz	
	AC	~ 30Hz	

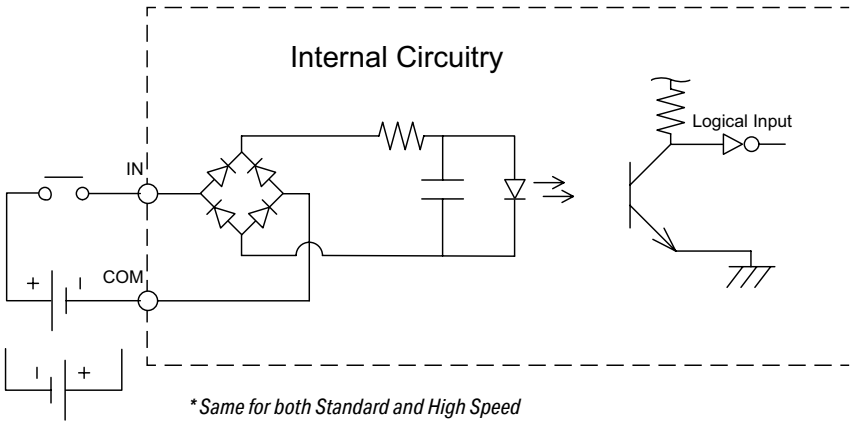
1. All Inputs may be used as standard inputs or high speed inputs independently.
2. 60Hz to 240Hz filter should be set in the software when using an AC line signal.

BX-DM1E-10ED13-D Wiring, Continued

Discrete Input Connection Options



Discrete Input Internal Circuitry *



** Same for both Standard and High Speed*

12-24 VDC

BX-DM1E-10ED13-D Wiring, Continued

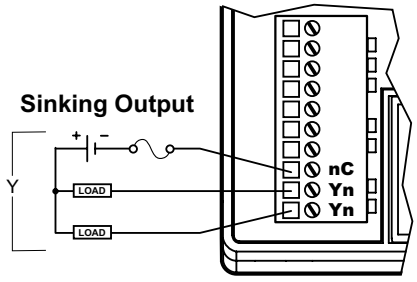
Discrete Output Specifications

Discrete Output Specifications		
Output Type	Sinking	
Total Outputs per Module	4	
Commons	2 (2 points/common) Isolated	
Maximum Current per Common	1A	
Nominal Voltage Range	12–24 VDC	
Operating Voltage Range	5–36 VDC	
Maximum 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	
Status Indicators	Logic Side, Green	
Output Details		
Output Type	High-Speed	Standard[1]
Location	Y0...Y1	Y2...Y3
OFF to ON Response	< 2µs	< 5ms
ON to OFF Response	< 2µs	< 2ms
Maximum Switching Frequency	1m cable - 250kHz 10m cable - 100kHz	~ 100Hz
Overcurrent, Short Circuit Protection and Short to Ground	Current limit by Common Group, self-resetting	N/A
Overcurrent Trip Level[2]	Between 4A and 8A	N/A
Fuse Type	User-supplied external fuse	

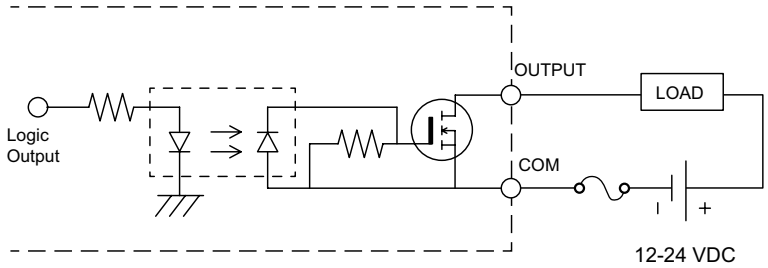
1. *All outputs may be used as standard outputs. Only the first 2 outputs (Y0...Y1) are capable of high-speed DC operation.*
2. *When the high-speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1E-10ED13-D Wiring, Continued

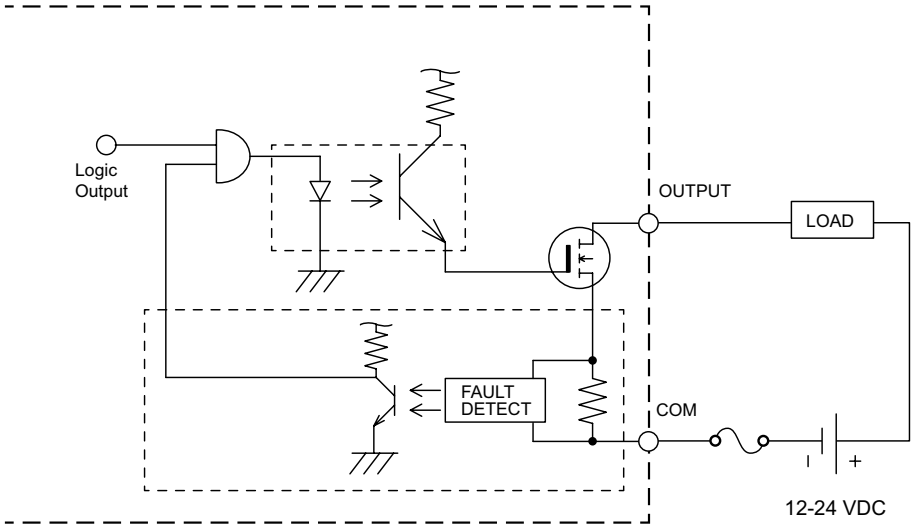
Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



Discrete High-Speed Output Internal Circuitry



NOTE: *When the high speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1E-10ED13-D Wiring, Continued

Analog Input Specifications

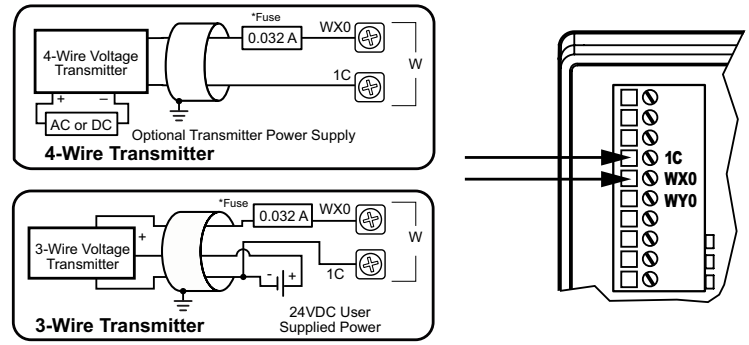
Analog Input Specifications	
Inputs per Module	1
Commons	1
Input Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Input Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Input Impedance Voltage Modes	100kΩ
Absolute Maximum Input, Voltage Mode	±30V
Input Impedance Current Modes	249Ω
Absolute Maximum Input, Current Mode	±40mA sustained, ±100mA for < 5s
Conversion Time	1.2 ms
Input Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

BX-DM1E-10ED13-D Wiring, Continued

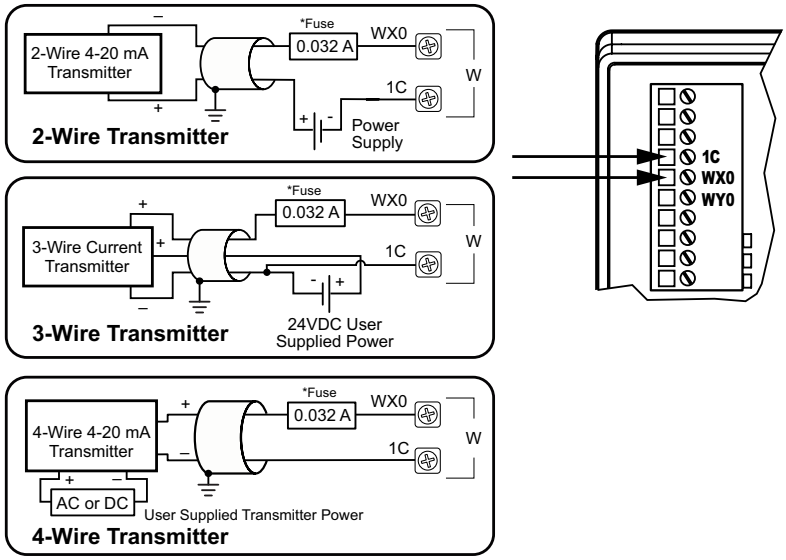
Analog Input Connections Options

Analog Voltage Input Circuits



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

Analog Current Sinking Input Circuits



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

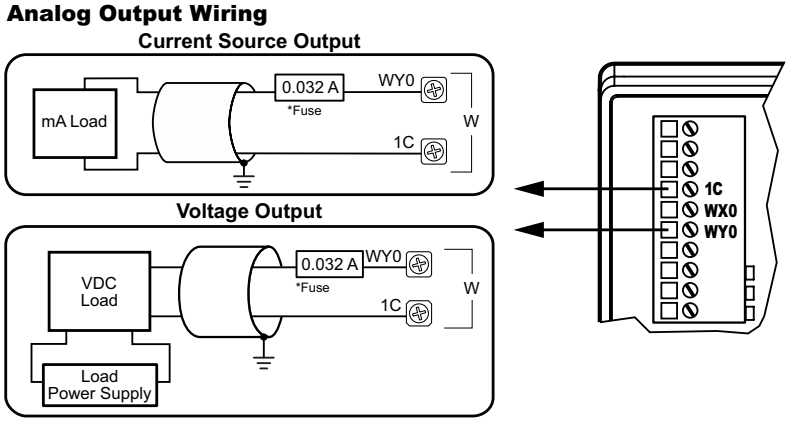
BX-DM1E-10ED13-D Wiring, Continued

Analog Output Specifications

Analog Output Specifications	
Outputs per Module	1
Commons	1
Output Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Output Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Minimum Voltage Load Impedance	1kΩ
Maximum Current Load Impedance	500Ω
Maximum Rating	Continuous Short Circuit Protected
Settling Time	< 1ms
Output Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

Analog Output Connections Options



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

BX-DM1E-10ED23-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - sinking/sourcing; rated for 12–24 VAC/VDC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - sourcing; rated at 12–24 VDC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common in each group.
- One (1) analog input and one (1) analog output. The analog inputs and outputs are located along the front left side of the unit. The analog inputs and outputs are grouped together on 3 terminals consisting of 1 analog input, 1 analog output and a shared analog common.
  - current or voltage selectable through software
  - 16-bit resolution @ ±10V, ±20mA
  - current signal ranges of 4–20 mA, ±20 mA
  - voltage signal ranges of 0–5 VDC, 0–10 VDC, ±5VDC, ±10VDC

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply

BX-DM1E-10ED23-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

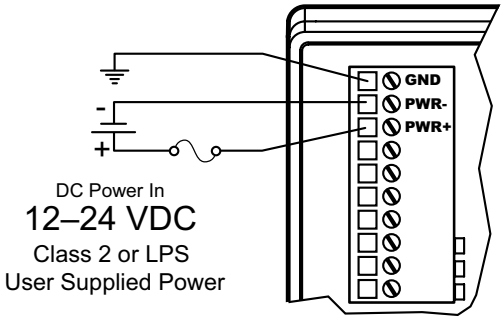
BX-DM1E-10ED23-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	8.7 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1E-10ED23-D Wiring, Continued

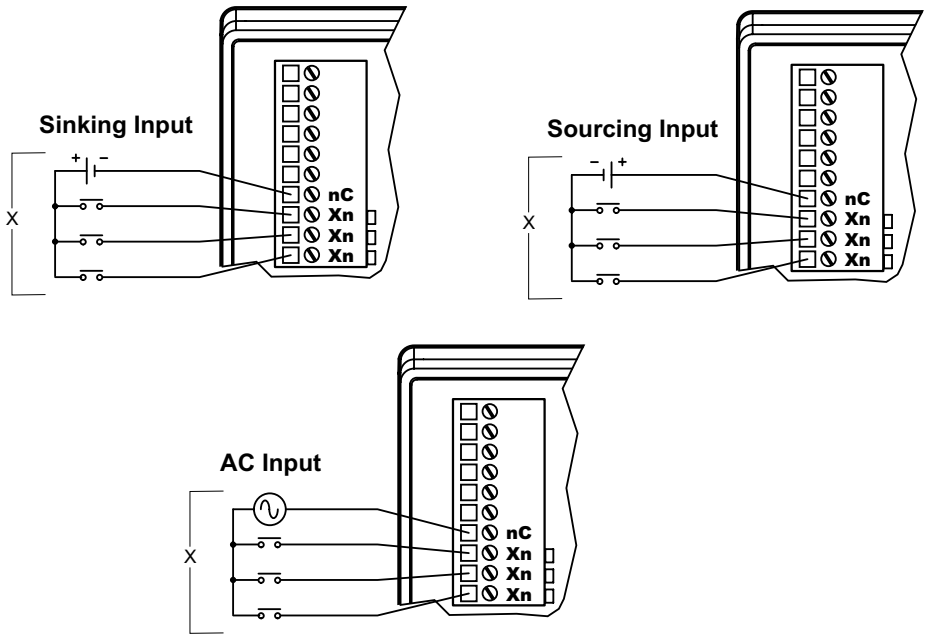
Discrete Input Specifications

Discrete Input Specifications			
Input Type		Sink/Source	
Total Inputs per Module		6	
Commons		2 (3 points/common) Isolated	
Nominal Voltage Range		12–24 VAC/VDC	
Input Voltage Range		9–30 VAC/VDC	
Maximum Voltage		30 VAC/VDC	
DC Frequency		0–250 kHz - High-speed	
Minimum Pulse Width		0.5 µs - High-speed	
AC Frequency		47–63 Hz[2]	
Input Impedance		3kΩ @ 24VDC	
Input Current (typical)		6mA @ 24 VAC/VDC	
Maximum Input Current		12mA @ 30 VAC/VDC	
ON Voltage Level		> 9.0 VAC/VDC	
OFF Voltage Level		< 2.0 VAC/VDC	
Maximum OFF Current		2.0 mA	
Status Indicators		Logic Side, Green	
Input Details			
Input Type		High-Speed DC	Standard[1]
Location		X0...X5	
OFF to ON Response	DC	< 2µs	
	AC	–	10ms[2]
ON to OFF Response	DC	< 2µs	
	AC	–	10ms[2]
Maximum Switching Frequency	DC	250kHz	
	AC	~ 30Hz	

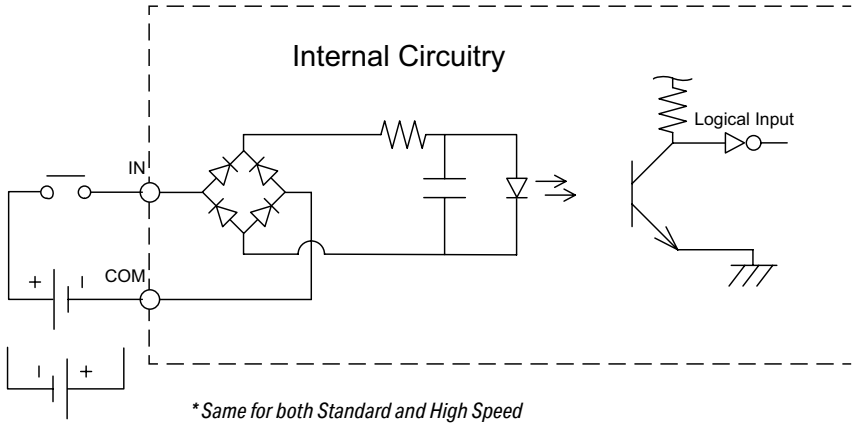
1. *All Inputs may be used as standard inputs or high speed inputs independently.*
2. *60Hz to 240Hz filter should be set in the software when using an AC line signal.*

BX-DM1E-10ED23-D Wiring, Continued

Discrete Input Connection Options



Discrete Input Internal Circuitry *



** Same for both Standard and High Speed*

BX-DM1E-10ED23-D Wiring, Continued

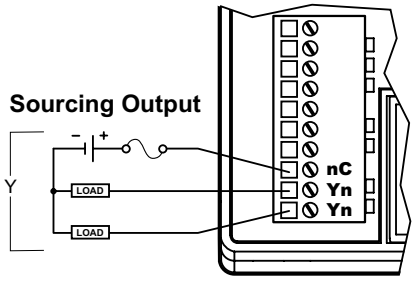
Discrete Output Specifications

Discrete Output Specifications		
Output Type	Sourcing	
Total Outputs per Module	4	
Commons	2 (2 points/common) Isolated	
Maximum Current per Common	1A	
Nominal Voltage Range	12–24 VDC	
Operating Voltage Range	5–36 VDC	
Maximum 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	
Status Indicators	Logic Side, Green	
Output Details		
Output Type	High-Speed	Standard[1]
Location	Y0...Y1	Y2...Y3
OFF to ON Response	< 2µs	< 5ms
ON to OFF Response	< 2µs	< 2ms
Maximum Switching Frequency	1m cable - 250kHz 10m cable - 100kHz	~ 100Hz
Overcurrent, Short Circuit Protection and Short to Ground	Current limit by Common Group, self-resetting	N/A
Overcurrent Trip Level[2]	Between 4A and 8A	N/A
Fuse Type	User-supplied external fuse	

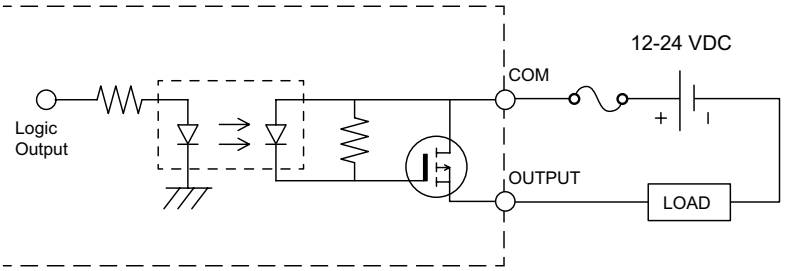
1. *All outputs may be used as standard outputs. Only the first 2 outputs (Y0...Y1) are capable of high-speed DC operation.*
2. *When the high-speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1E-10ED23-D Wiring, Continued

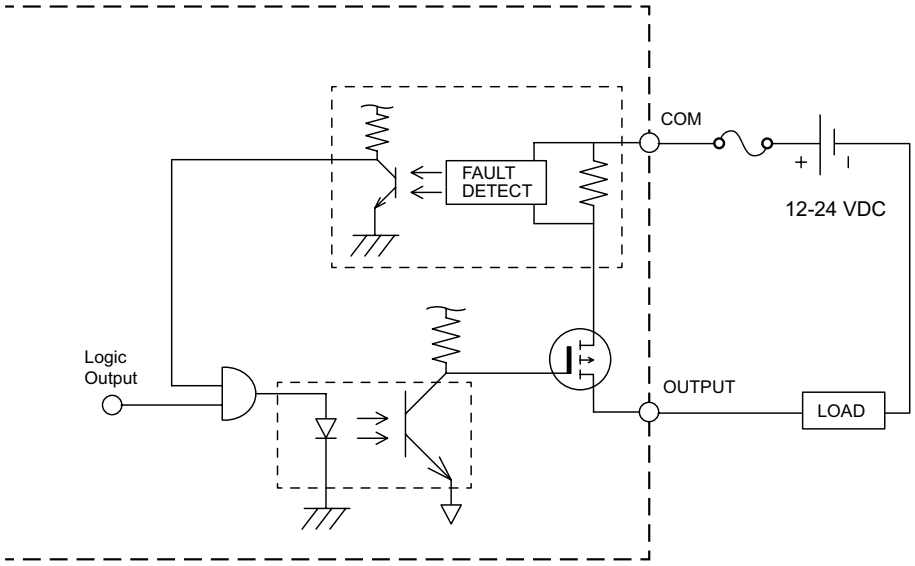
Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



Discrete High-Speed Output Internal Circuitry



NOTE: *When the high speed outputs are in an overcurrent situation, the Common terminal Red LED is on. The output LEDs will remain operational even though the output circuitry is turned off and no power is flowing. This condition is not reported to the CPU.*

BX-DM1E-10ED23-D Wiring, Continued

Analog Input Specifications

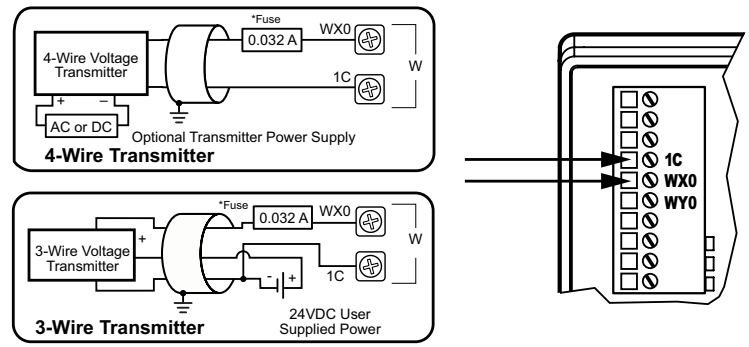
Analog Input Specifications	
Inputs per Module	1
Commons	1
Input Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Input Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Input Impedance Voltage Modes	100kΩ
Absolute Maximum Input, Voltage Mode	±30V
Input Impedance Current Modes	249Ω
Absolute Maximum Input, Current Mode	±40mA sustained, ±100mA for < 5s
Conversion Time	1.2 ms
Input Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

BX-DM1E-10ED23-D Wiring, Continued

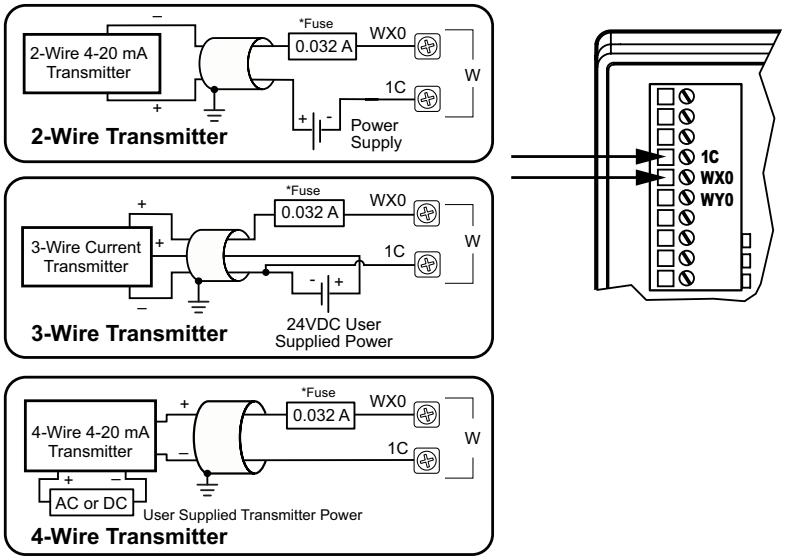
Analog Input Connections Options

Analog Voltage Input Circuits



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

Analog Current Sinking Input Circuits



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

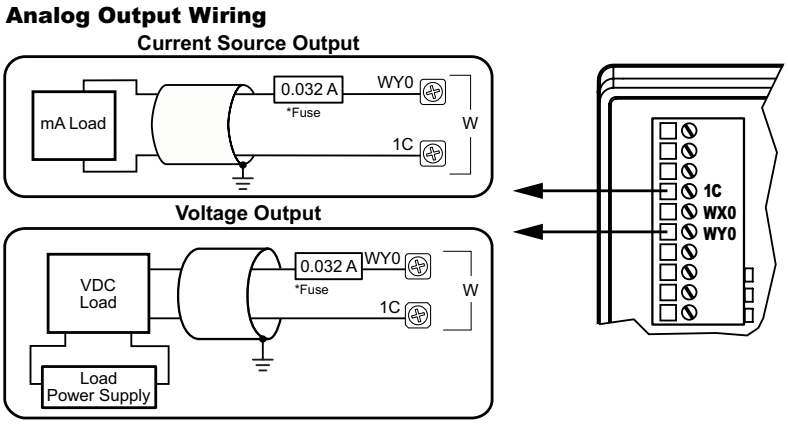
BX-DM1E-10ED23-D Wiring, Continued

Analog Output Specifications

Analog Output Specifications	
Outputs per Module	1
Commons	1
Output Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Output Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Minimum Voltage Load Impedance	1kΩ
Maximum Current Load Impedance	500Ω
Maximum Rating	Continuous Short Circuit Protected
Settling Time	< 1ms
Output Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

Analog Output Connections Options



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

BX-DM1E-10ER3-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - sinking/sourcing; rated for 12–24 VAC/VDC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - Form A Relay (SPST); rated 12–48 VDC/ 24–240 VAC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common in each group.
- One (1) analog input and one (1) analog output. The analog inputs and outputs are located along the front left side of the unit. The analog inputs and outputs are grouped together on 3 terminals consisting of 1 analog input, 1 analog output and a shared analog common.
  - current or voltage selectable through software
  - 16-bit resolution @ ±10V, ±20mA
  - current signal ranges of 4–20 mA, ±20 mA
  - voltage signal ranges of 0–5 VDC, 0–10 VDC, ±5VDC, ±10VDC

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply.

BX-DM1E-10ER3-D

NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

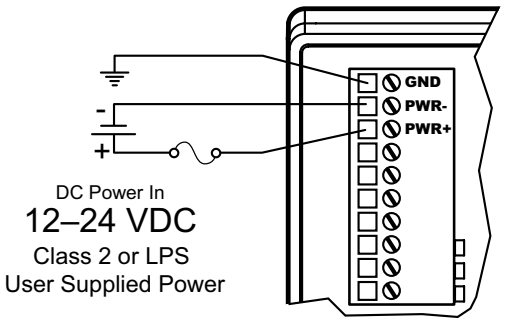
BX-DM1E-10ER3-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	10.3 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1E-10ER3-D Wiring, Continued

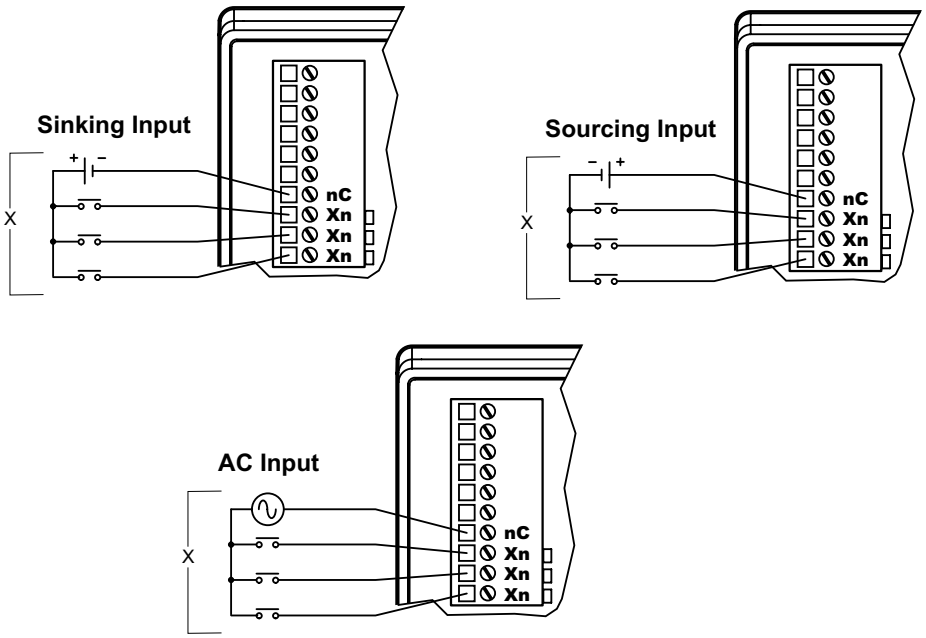
Discrete Input Specifications

Discrete Input Specifications			
Input Type		Sink/Source	
Total Inputs per Module		6	
Commons		2 (3 points/common) Isolated	
Nominal Voltage Range		12–24 VAC/VDC	
Input Voltage Range		9–30 VAC/VDC	
Maximum Voltage		30 VAC/VDC	
DC Frequency		0–250 kHz - High-speed	
Minimum Pulse Width		0.5 µs - High-speed	
AC Frequency		47–63 Hz[2]	
Input Impedance		3kΩ @ 24VDC	
Input Current (typical)		6mA @ 24 VAC/VDC	
Maximum Input Current		12mA @ 30 VAC/VDC	
ON Voltage Level		> 9.0 VAC/VDC	
OFF Voltage Level		< 2.0 VAC/VDC	
Maximum OFF Current		2.0 mA	
Status Indicators		Logic Side, Green	
Input Details			
Input Type		High-Speed DC	Standard[1]
Location		X0...X5	
OFF to ON Response	DC	< 2µs	
	AC	–	10ms[2]
ON to OFF Response	DC	< 2µs	
	AC	–	10ms[2]
Maximum Switching Frequency	DC	250kHz	
	AC	~ 30Hz	

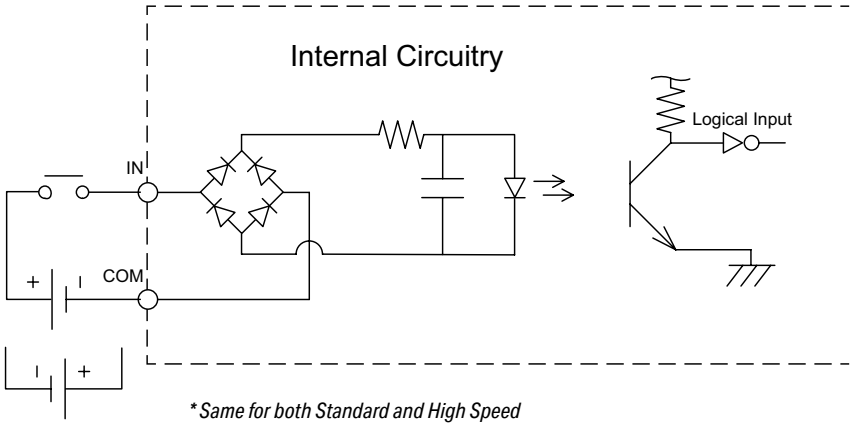
1. All Inputs may be used as standard inputs or high speed inputs independently.
2. 60Hz to 240Hz filter should be set in the software when using an AC line signal.

BX-DM1E-10ER3-D Wiring, Continued

Discrete Input Connection Options



Discrete Input Internal Circuitry *



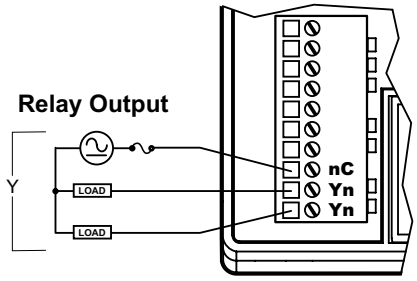
BX-DM1E-10ER3-D Wiring, Continued

Discrete Output Specifications

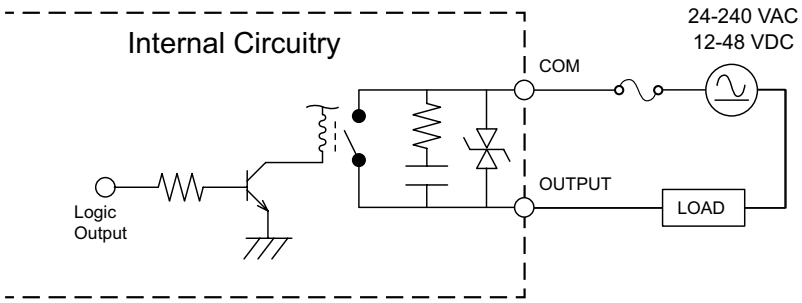
Discrete Output Specifications	
Output Type	Relay Form A (SPST)
Total Outputs per Module	4
Commons	2 (2 points/common) Isolated
Maximum Current per Common	4A
Nominal Voltage Range	12–48 VDC 24–240 VAC
Operating Voltage Range	5–60 VDC 5–264 VAC
Maximum Voltage	60VDC 264VAC
Minimum Output Current	0.1 mA @ 24VDC 0.1 mA @ 24VAC
Maximum Output Current	2A
Maximum Inrush Current	5A for 50ms
Maximum Leakage Current	1µA (DC), 300µA (AC) due to RC snubber circuit
ON Voltage Drop	0.2 V Max
Status Indicators	Logic Side, Green
Output Details	
Output Type	Standard
Location	Y0...Y3
ON-OFF Response	<10ms
OFF-ON Response	<10ms
Maximum Switching Frequency	10Hz
Relay Cycle Life Mechanical Endurance Electrical Endurance	 5 million operations 120,000 operations
Fuse Type	User-supplied external fuse

BX-DM1E-10ER3-D Wiring, Continued

Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



BX-DM1E-10ER3-D Wiring, Continued

Analog Input Specifications

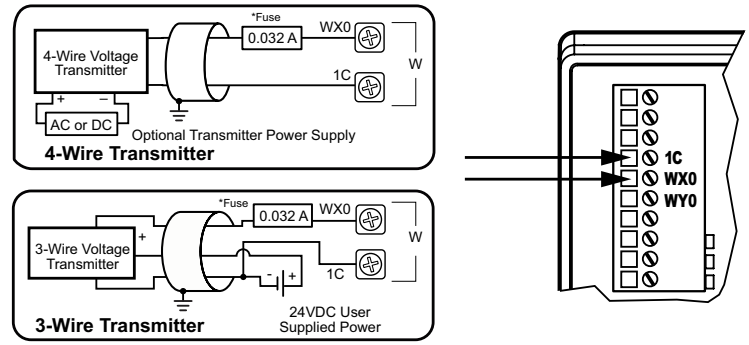
Analog Input Specifications	
Inputs per Module	1
Commons	1
Input Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Input Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Input Impedance Voltage Modes	100kΩ
Absolute Maximum Input, Voltage Mode	±30V
Input Impedance Current Modes	249Ω
Absolute Maximum Input, Current Mode	±40mA sustained, ±100mA for < 5s
Conversion Time	1.2 ms
Input Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

BX-DM1E-10ER3-D Wiring, Continued

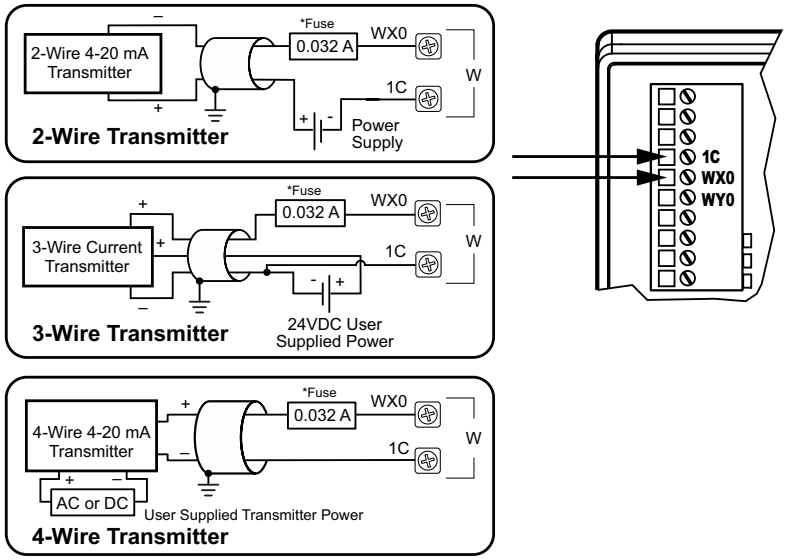
Analog Input Connections Options

Analog Voltage Input Circuits



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

Analog Current Sinking Input Circuits



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

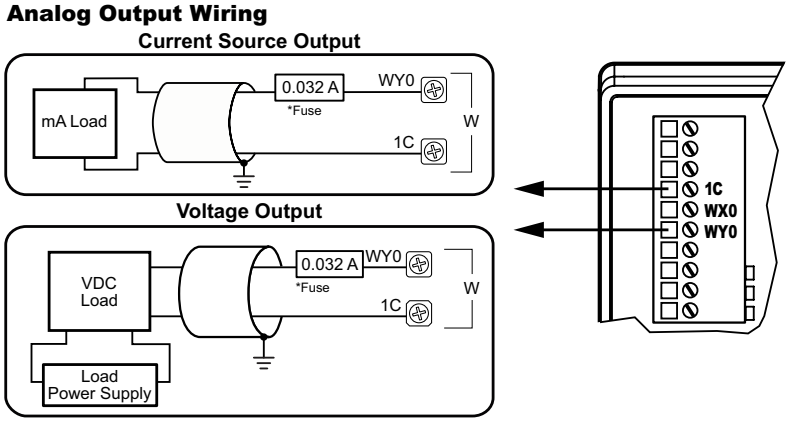
BX-DM1E-10ER3-D Wiring, Continued

Analog Output Specifications

Analog Output Specifications	
Outputs per Module	1
Commons	1
Output Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Output Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Minimum Voltage Load Impedance	1kΩ
Maximum Current Load Impedance	500Ω
Maximum Rating	Continuous Short Circuit Protected
Settling Time	< 1ms
Output Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

Analog Output Connections Options



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

BX-DM1E-10AR3-D Wiring

This MPU has 10 discrete I/O points. The connections are grouped as follows:

- Six (6) discrete inputs - AC rated for 120–240 VAC. They are located along the front left of the unit; organized into groups of 4 terminals consisting of 3 inputs and an isolated common in each group.
- Four (4) discrete outputs - Form A Relay (SPST); rated 12–48 VDC/ 24–240 VAC. They are located along the front left of the unit. The outputs are organized into groups of 3 terminals consisting of 2 outputs and an isolated common in each group.
- One (1) analog input and one (1) analog output. The analog inputs and outputs are located along the front left side of the unit. The analog inputs and outputs are grouped together on 3 terminals consisting of 1 analog input, 1 analog output and a shared analog common.
  - current or voltage selectable through software
  - 16-bit resolution @ ±10V, ±20mA
  - current signal ranges of 4–20 mA, ±20 mA
  - voltage signal ranges of 0–5 VDC, 0–10 VDC, ±5VDC, ±10VDC

This MPU requires an external 12–24 VDC power supply. The DC power supply connection is located on the top left side of the unit. There is no 24VDC auxiliary output supply

BX-DM1E-10AR3-D

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NOTE: *Eight (8) Expansion Modules can be connected to extend I/O capacity, as long as the MPU power budget is not exceeded.*

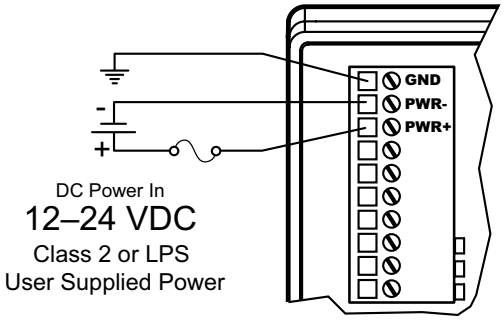
BX-DM1E-10AR3-D Wiring, Continued

Power Supply Specifications

Power Supply Specifications	
Nominal Voltage Range*	12–24 VDC
Input Voltage Range (Tolerance)*	10–36 VDC
Maximum Input Voltage Ripple	< ±10%
Maximum Input Power	14W
Cold Start Inrush Current	5A, 2ms
Maximum Inrush Current (Hot Start)	5A, 2ms
Internal Input Protection	Reverse polarity protection and undervoltage lockout via transistor circuit
Acceptable External Power Drop Time	10ms
Under Input Voltage Lock-out	< 9VDC
Heat Dissipation	10.1 W Max
Isolated User 24VDC Output	None
Voltage Withstand (dielectric)	1500VAC power Inputs to ground applied for 1 minute
Insulation Resistance	>10MΩ @ 500VDC
Software Version Required	Do-more! Designer version 2.0 or later

** Class 2 or LPS Power Supply required.*

Power Supply Connections



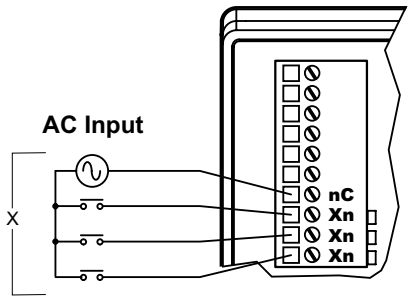
WARNING: The BRX System MUST have a proper earth ground. Do not operate the BRX MPU without proper earth grounding.

BX-DM1E-10AR3-D Wiring, Continued

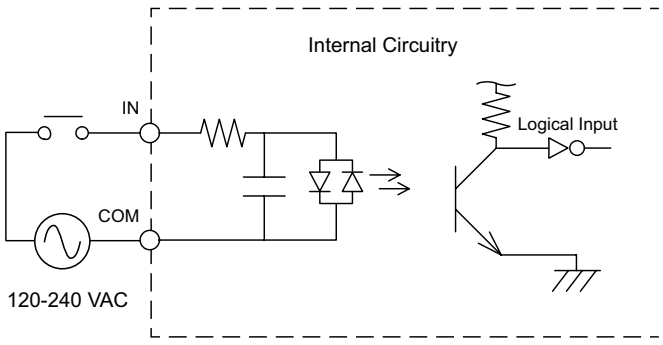
Discrete Input Specifications

Discrete Input Specifications	
Input Type	AC
Total Inputs per Module	6
Commons	2 (3 points/common) Isolated
Nominal Voltage Range	120–240 VAC
Input Voltage Range	85–264 VAC
Maximum Voltage	264VAC RMS
AC Frequency	47–63 Hz
Input Impedance	15kΩ
Input Current (typical)	9mA @ 120VAC, 13mA @ 220VAC
Maximum Input Current	14mA @ 120VAC, 20mA @ 220VAC
ON Voltage Level	> 85VAC
OFF Voltage Level	< 40VAC
Maximum OFF Current	2.5 mA
Status Indicators	Logic Side, Green
Input Details	
Input Type	Standard
Location	X0...X5
OFF - ON Response	10ms
ON - OFF Response	10ms
Maximum Switching Frequency	~ 30Hz

Discrete Input Connection Options



Discrete Input Internal Circuitry



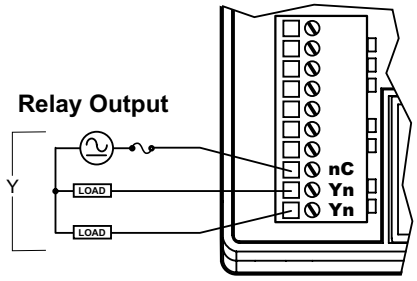
BX-DM1E-10AR3-D Wiring, Continued

Discrete Output Specifications

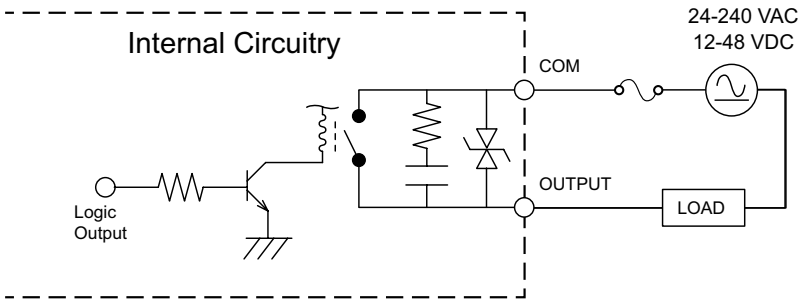
Discrete Output Specifications	
Output Type	Relay Form A (SPST)
Total Outputs per Module	4
Commons	2 (2 points/common) Isolated
Maximum Current per Common	4A
Nominal Voltage Range	12–48 VDC 24–240 VAC
Operating Voltage Range	5–60 VDC 5–264 VAC
Maximum Voltage	60VDC 264VAC
Minimum Output Current	0.1 mA @ 24VDC 0.1 mA @ 24VAC
Maximum Output Current	2A
Maximum Inrush Current	5A for 50ms
Maximum Leakage Current	1µA (DC), 300µA (AC) due to RC snubber circuit
ON Voltage Drop	0.2 V Max
Status Indicators	Logic Side, Green
Output Details	
Output Type	Standard
Location	Y0...Y3
ON-OFF Response	<10ms
OFF-ON Response	<10ms
Maximum Switching Frequency	10Hz
Relay Cycle Life Mechanical Endurance Electrical Endurance	 5 million operations 120,000 operations
Fuse Type	User-supplied external fuse

BX-DM1E-10AR3-D Wiring, Continued

Discrete Output Connection Options



Discrete Standard Output Internal Circuitry



BX-DM1E-10AR3-D Wiring, Continued

Analog Input Specifications

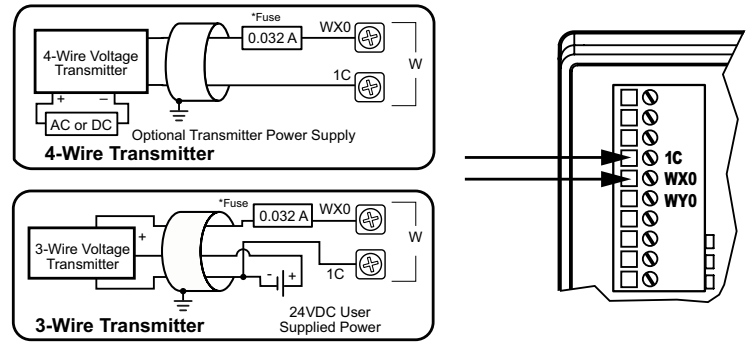
Analog Input Specifications	
Inputs per Module	1
Commons	1
Input Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Input Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Input Impedance Voltage Modes	100kΩ
Absolute Maximum Input, Voltage Mode	±30V
Input Impedance Current Modes	249Ω
Absolute Maximum Input, Current Mode	±40mA sustained, ±100mA for < 5s
Conversion Time	1.2 ms
Input Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

BX-DM1E-10DAR3-D Wiring, Continued

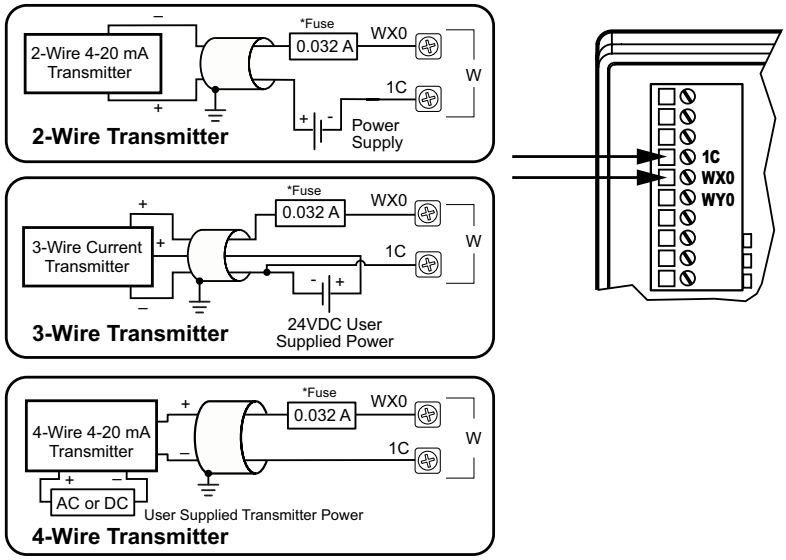
Analog Input Connections Options

Analog Voltage Input Circuits



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

Analog Current Sinking Input Circuits



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

BX-DM1E-10AR3-D Wiring, Continued

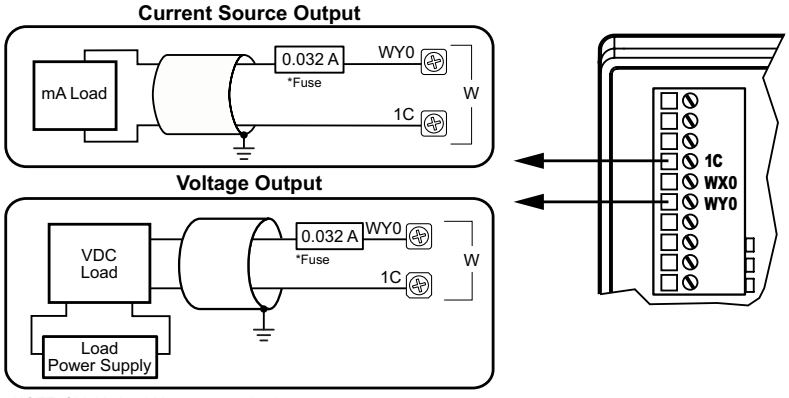
Analog Output Specifications

Analog Output Specifications	
Outputs per Module	1
Commons	1
Output Voltage Range *	Software Selectable ±10V, ±5V, 0–10 V, 0–5 V
Output Current Range *	Software Selectable ±20mA, 4–20 mA
Resolution ±10V, ±20mA ±5V 0–5 V 4–20 mA 0–10 V	 16 bits (0–65535 counts) 15 bits (0–32767 counts) 14 bits (0–16383 counts) ~15 bits (6553–32767 counts) 15 bits (0–32767 counts)
Minimum Voltage Load Impedance	1kΩ
Maximum Current Load Impedance	500Ω
Maximum Rating	Continuous Short Circuit Protected
Settling Time	< 1ms
Output Stability	0.02% of Full Hardware Range = 13 Counts
Full Scale Calibration Error	0.05% of Full Hardware Range = 33 Counts
Offset Calibration Error	0.01% of Full Hardware Range = 7 Counts
Accuracy vs Temperature Error	0.05% of Full Hardware Range = 33 Counts
Maximum Linearity Error (End to End)	0.1% of Full Hardware Range = 66 Counts
Maximum Inaccuracy	0.2% of Full Hardware Range = 131 Counts
Fuse Type	User-supplied external fuse

** Software selectable per channel*

Analog Output Connections Options

Analog Output Wiring



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

NOTE: *An Edison S500-32-R 0.032A fast-acting fuse is recommended for all analog voltage inputs, analog outputs, and current loops.*

Notes: