R50-LB-ZPA Series Zero-Pressure Accumulation Control Module Manual

Original Instructions
p/n: 248212 Rev. C
01-Oct-25

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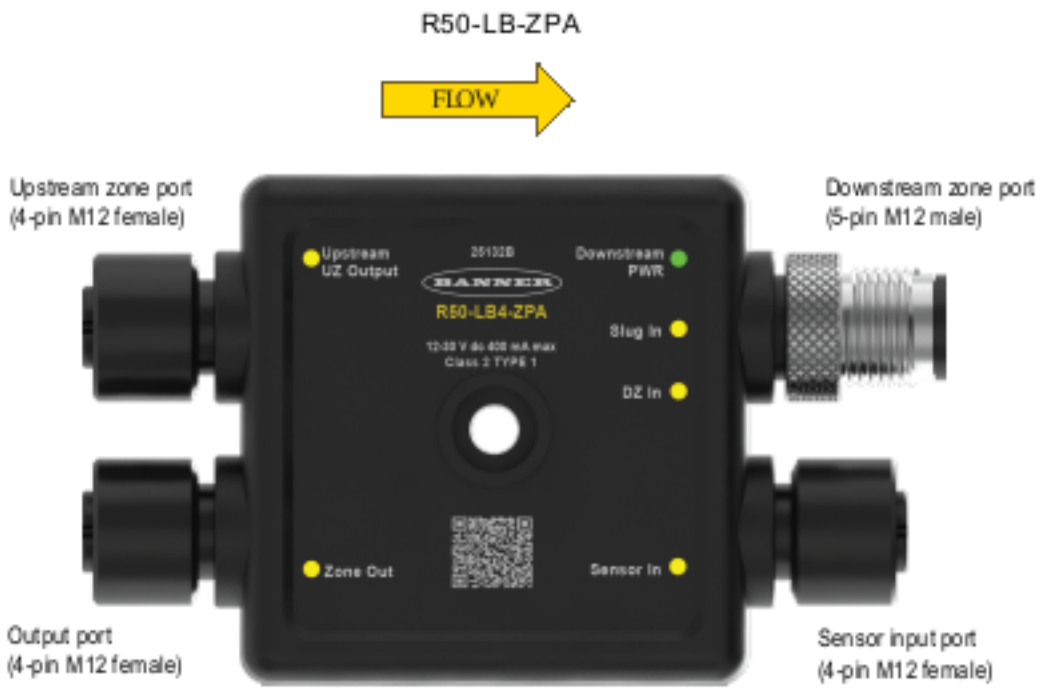
Chapter 1 Technical Information

Overview

Zero-pressure accumulation (ZPA) conveyors are material handling systems designed to move and stage products in discrete conveyor zones without allowing the object they are moving to contact or exert pressure on one downstream of it.



Each zone has its own drive mechanism and a zone sensor that detects the presence of a product. In a system using the R50-LB-ZPA Series Zero-Pressure Accumulation Control Module, the sensor's signal is processed by the control module to control the output signal that tells that zone it can advance. The module also exchanges status information with adjacent upstream and downstream control modules. When a downstream zone becomes occupied, the upstream zone is stopped until the downstream zone clears, ensuring smooth accumulation without collisions or jams. This zone-to-zone communication allows the conveyor to automatically adapt to product flow, maintaining consistent spacing and gentle handling during accumulation.

Some ZPA systems also support slug release mode, where multiple zones release simultaneously rather than one at a time. In slug release, the logic ignores individual zone sensor inputs for release timing and instead starts all upstream zones together when the downstream path becomes clear. This mode enables faster clearing of accumulated products when rapid throughput is required, while still coordinating with downstream zone logic to prevent jams.

Models

Model	Sensor Input Pin
R50-LB2-ZPA	Pin 2
R50-LB4-ZPA	Pin 4

Specifications

Supply Voltage
12 V DC to 30 V DC at 400 mA maximum

Power Pass-Through Current
4 A

Discrete Output Load Rating

200 mA

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Leakage Current Immunity

400 µA

Indicators

See Status Indicators "R50-LB-ZPA Status Indicators" on page 8

Connections

Three 4-pin A-Code M12 female nylon quick-disconnect connectors

One 5-pin A-Code M12 male nylon quick-disconnect connector

Construction

Coupling nut material: Nylon

Connector body: PVC translucent black

Vibration and Mechanical Shock

Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 0.5 mm amplitude, 5 minutes sweep, 30 minutes dwell)

Meets IEC 60068-2-27 requirements (Shock: 15G 11 ms duration, half sine wave)

Product Identification

SNAP SIGNAL®

Environmental Rating

IP65, IP67, IP68

Operating Conditions

Temperature: –40 °C to +70 °C (–40 °F to +158 °F)

90% at +70 °C maximum relative humidity (non-condensing)

Storage Temperature: –40 °C to +80 °C (–40 °F to +176 °F)

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

c UL us LISTED IND.CONT.EQ. E316212

Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	2.0	30	0.5

FCC Part 15 Class A for Unintentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

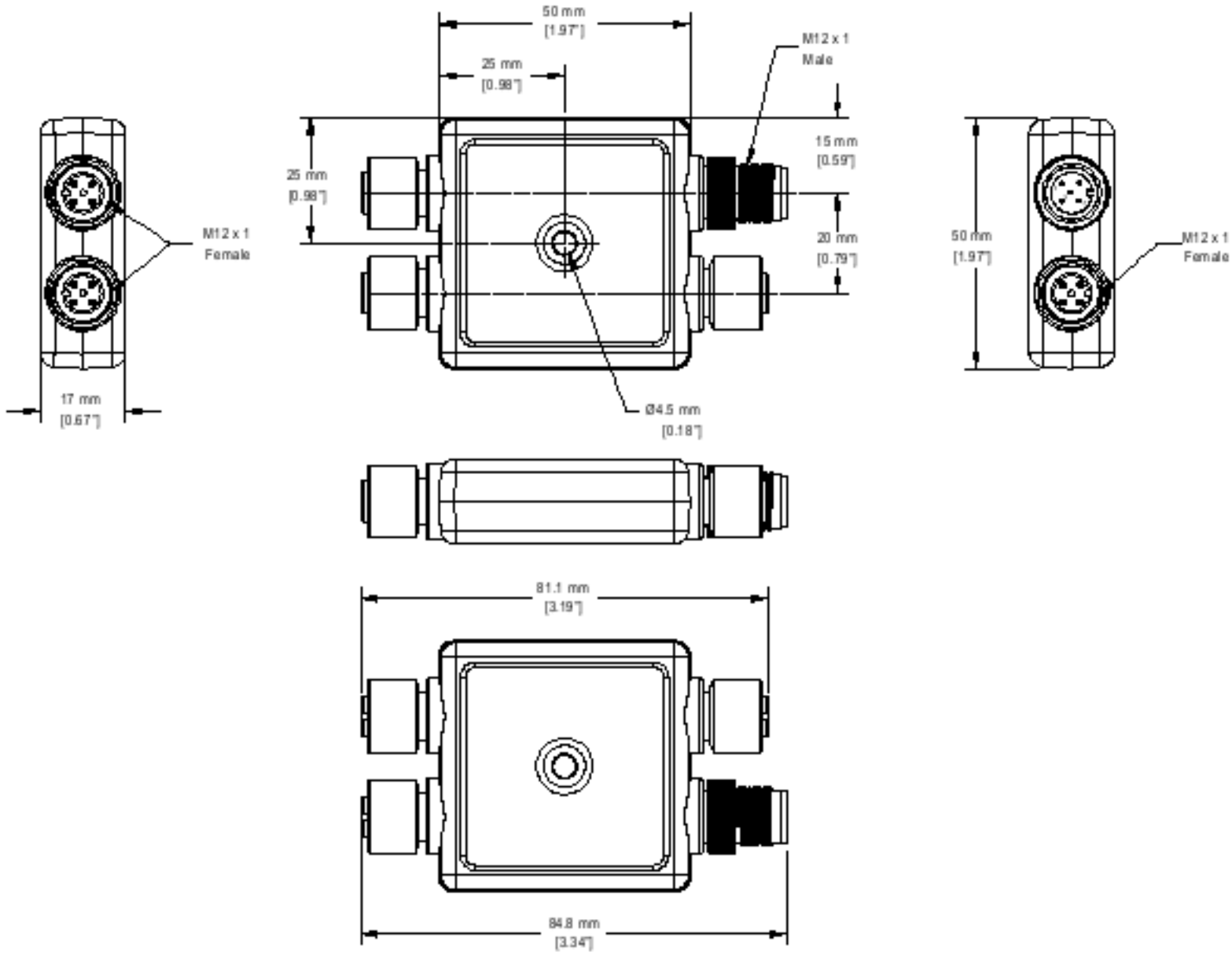
Industry Canada ICES-003(A)

This device complies with CAN ICES-3 (A)/NMB-3(A). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme NMB-3(A). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.



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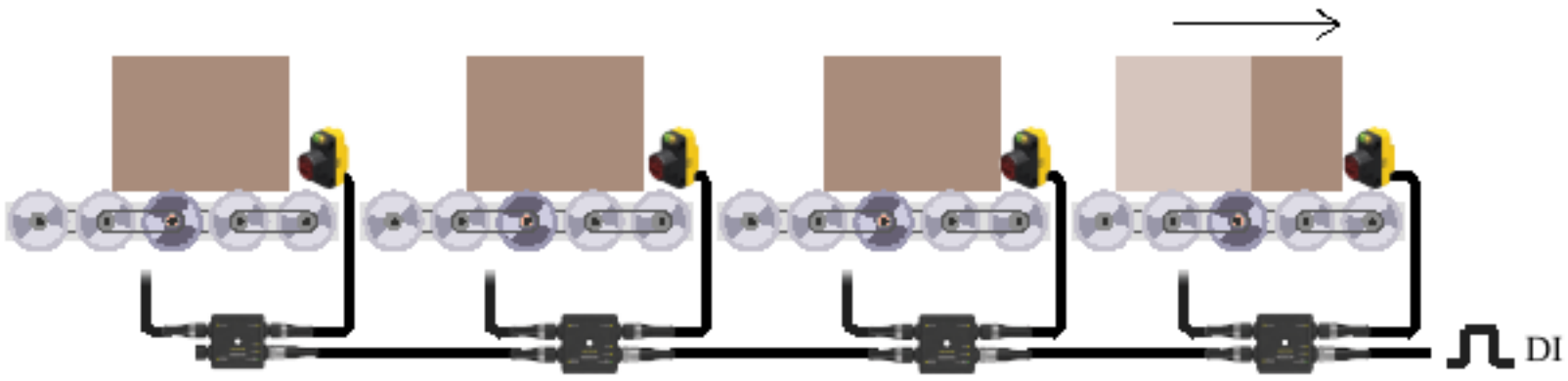
Chapter 2 Operating Instructions

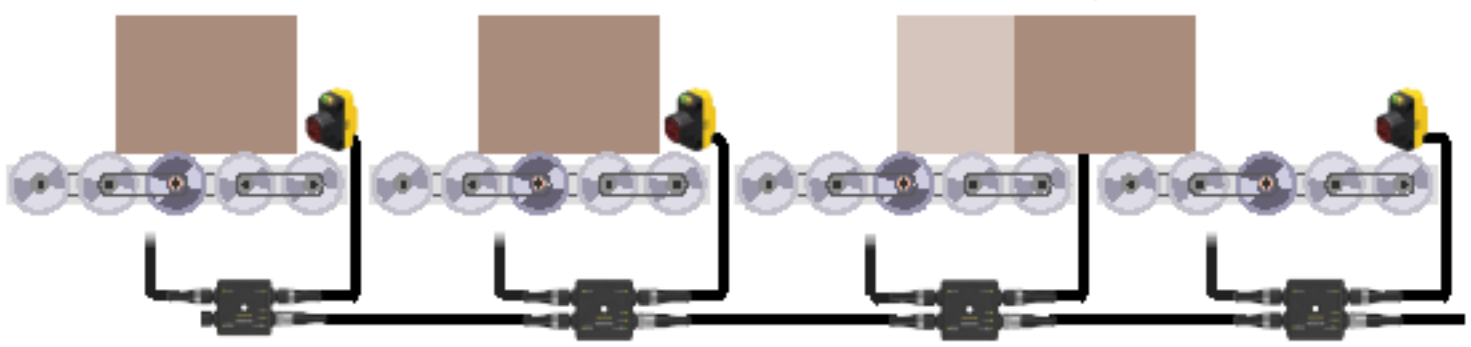
Zero Pressure Accumulation (ZPA) Mode

In ZPA mode, each zone is autonomous.

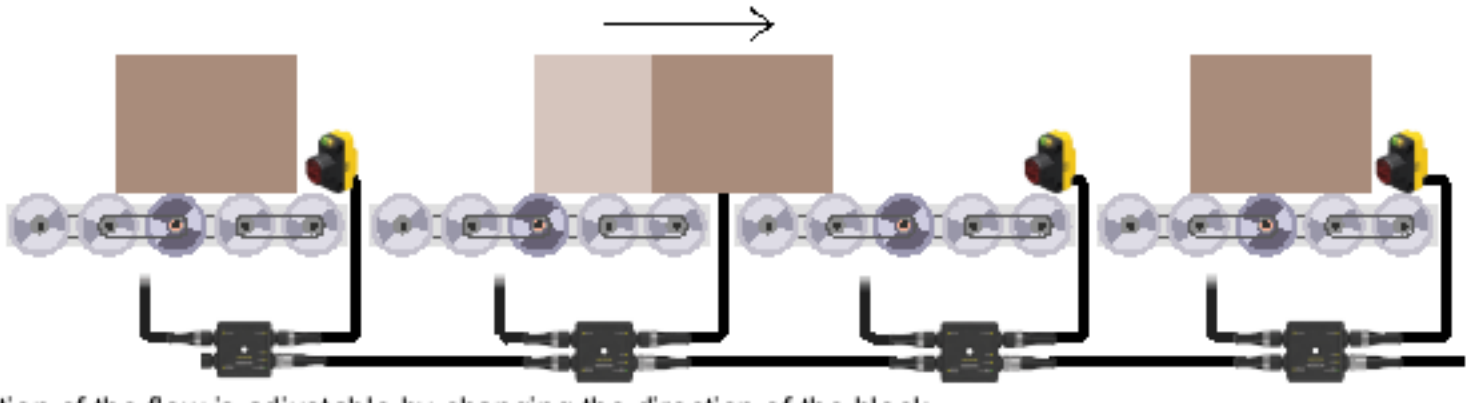
A discrete signal tells the first zone when to move



After the sensor is clear, the zone behind it is allowed to move



Then the previous zone is allowed to move

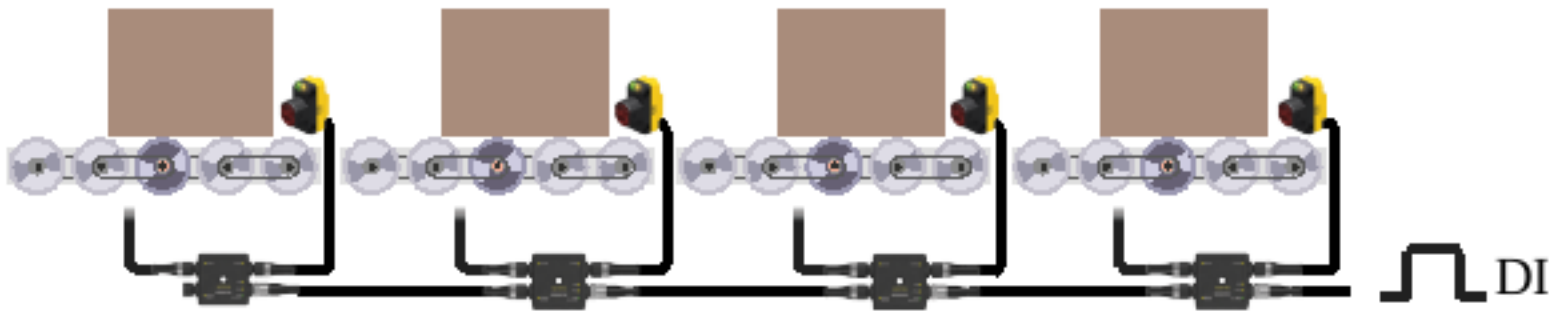


The direction of the flow is adjustable by changing the direction of the block.

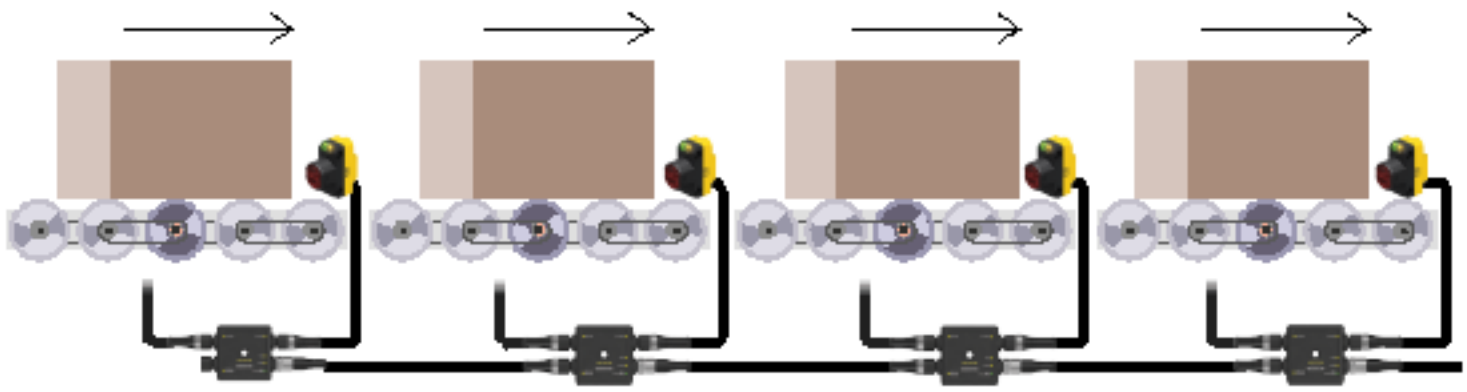
Slug Release Mode

In Slug release mode, each zone is tied to the zone in front of it. A discrete signal tells the first zone when it can move and sensor zone control is ignored.

A discrete signal tells the first zone when it can move



All upstream zones move with the first zone



Direction and timing:

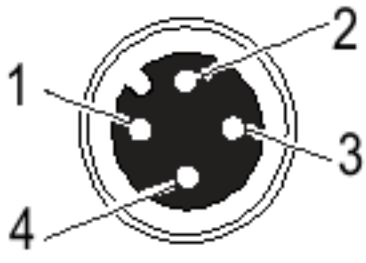
- All zones release together for faster release of staged boxes
- Direction of flow is also adjustable by changing the direction of the block

Wiring

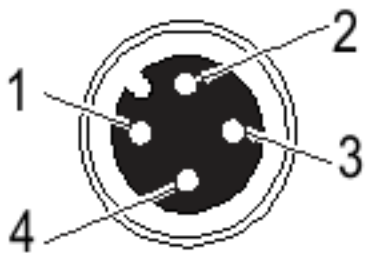
Downstream zone port (male)

5-pin A-Code M12 male pinout	Pin	Signal Description
	1	12 to 30 V DC
	2	Slug logic input
	3	GND
	4	Downstream zone ready input
	5	Not used

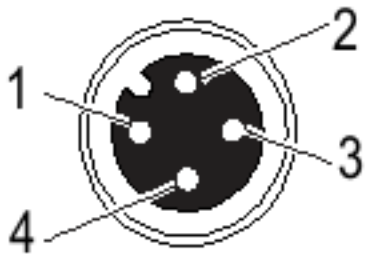
Sensor input port (female)

4-pin A-Code M12 female pinout	Pin	Signal Description
	1	12 to 30 V DC
	2	PNP discrete input for model R50-LB2-ZPA
	3	GND
	4	PNP discrete input for model R50-LB4-ZPA

Upstream zone (female)

4-pin A-Code M12 female pinout	Pin	Signal Description
	1	12 to 30 V DC
	2	Slug logic output
	3	GND
	4	Upstream ready output

Output port (female)

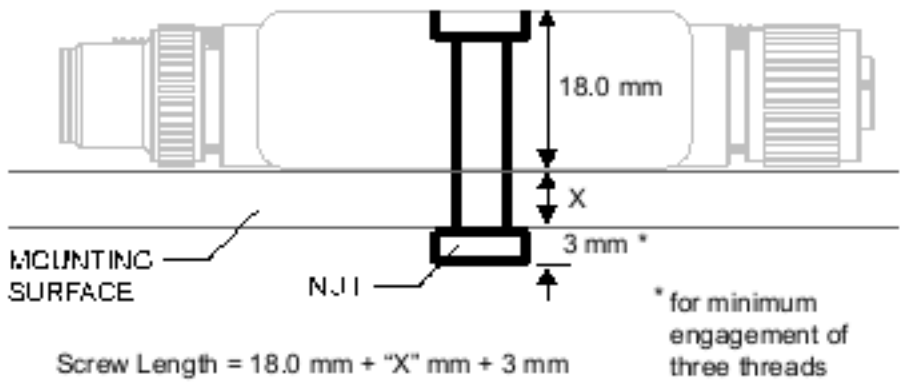
4-pin A-Code M12 female pinout	Pin	Signal Description
	1	Not used
	2	PNP complimentary output
	3	Not used
	4	PNP discrete output

Mechanical Installation

Install the control module to allow access for functional checks, maintenance, and service or replacement.

Fasteners must be of sufficient strength to guard against breakage. The use of permanent fasteners or locking hardware is recommended to prevent the loosening or displacement of the device. The mounting hole (4.5 mm) in the control module accepts M4 (#8) hardware.

See the figure below to help in determining the minimum screw length.



CAUTION: Do not overtighten the control module's mounting screw during installation. Overtightening can affect the performance of the control module.

Status Indicators

The control module has matching LED indicators on both sides of the converter to allow for installation needs, while still providing adequate indication visibility.

Description	LED Color	LED Off	LED On
Downstream PWR	Green	Power off	Power on
Downstream (DZ) In	Amber	Input (pin 4) downstream zone ready inactive	Input (Pin 4) downstream zone ready active

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Continued from page 8

Description	LED Color	LED Off	LED On
Slug In	Amber	Input (pin 2) slug logic inactive	Input (pin 2) slug logic active
Sensor In	Amber	PNP discrete input inactive	PNP discrete input active
Upstream (UZ) Output	Amber	Output (Pin 4) upstream zone ready inactive	Output (pin 4) upstream zone ready active
Zone Out	Amber	PNP discrete output (pin 4) inactive	PNP discrete output (pin 4) active

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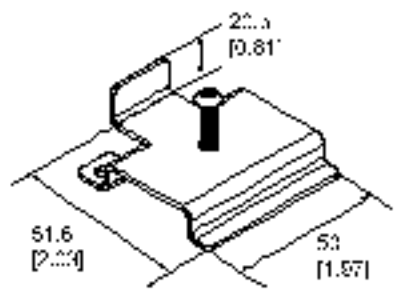
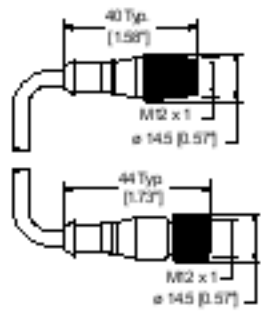
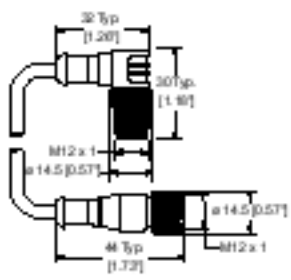
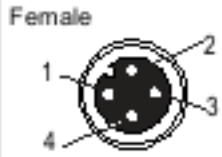
Chapter 3 Accessories

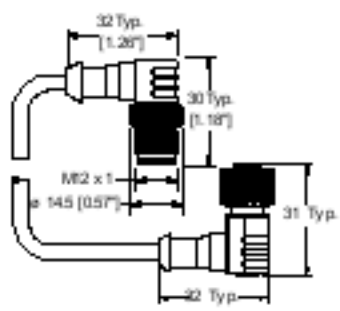
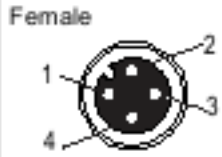
SMBR50

- R50 flat mount bracket
- M4 x 0.7 mm



4-pin A-Code Double-Ended M12 Female to M12 Male Cordsets				
Model	Length	Dimensions (mm)	Pinouts	
BC-M12F4-M12M4-22-1	1 m (3.28 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black
BC-M12F4-M12M4-22-2	2 m (6.56 ft)			
BC-M12F4-M12M4-22-3	3 m (9.84 ft)			
BC-M12F4-M12M4-22-4	4 m (13.12 ft)			
BC-M12F4-M12M4-22-5	5 m (16.4 ft)			
BC-M12F4-M12M4-22-10	10 m (30.81 ft)			
BC-M12F4-M12M4-22-15	15 m (49.2 ft)			

4-pin A-Code Double-Ended M12 Female to M12 Male Right-Angle Cordsets				
Model	Length	Dimensions (mm)	Pinouts	
BC-M12F4-M12M4A-22-1	1 m (3.28 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black
BC-M12F4-M12M4A-22-2	2 m (6.56 ft)			
BC-M12F4-M12M4A-22-5	5 m (16.4 ft)			
BC-M12F4-M12M4A-22-8	8 m (26.25 ft)			
BC-M12F4-M12M4A-22-10	10 m (30.81 ft)			
BC-M12F4-M12M4A-22-15	15 m (49.2 ft)			

4-pin A-Code Double-Ended M12 Female Right-Angle to M12 Male Right-Angle Cordsets				
Model	Length	Dimensions (mm)	Pinouts	
BC-M12F4A-M12M4A-22-0.3	0.3 m (1 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black
BC-M12F4A-M12M4A-22-1	1 m (3.28 ft)			
BC-M12F4A-M12M4A-22-2	2 m (6.56 ft)			
BC-M12F4A-M12M4A-22-5	5 m (16.4 ft)			
BC-M12F4A-M12M4A-22-8	8 m (26.25 ft)			
BC-M12F4A-M12M4A-22-10	10 m (30.81 ft)			
BC-M12F4A-M12M4A-22-15	15 m (49.2 ft)			

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Chapter 4 Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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