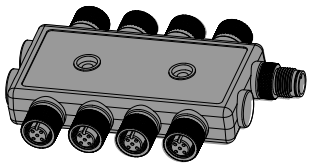
R95C 8-Port Analog In to Modbus® Hub Instruction Manual

Original Instructions
p/n: 233568 Rev. C
06-Aug-24

Contents

Chapter Contents

Chapter 1 Features



- Compact analog to Modbus® device converter that connects up to eight analog sources and outputs the values
- Rugged over-molded design meets IP65, IP67, and IP68
- Connects directly to a sensor or anywhere in-line for ease of use
- R95C Modbus hubs are a quick, easy, and economical way to integrate non-Modbus devices into a Modbus system

Model

Model Name	Function	Control	Connectors
R95C-8UI-MQ	8-port voltage/current analog input converter	Modbus®	(8) Integral 4-pin M12 female quick-disconnect connector (1) Integral 5-pin M12 male quick-disconnect connector

Overview

When an analog input value is received by the R95C-8UI-MQ hub, the numerical representational value is represented via Modbus registers.

Analog Ranges

Voltage = 0 mV to 11,000 mV
Current = 0 µA to 24,000 µA

Chapter Contents

Chapter 2 Modbus Configuration

Analog In Port Type

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40001	Port Definition	0..255	Voltage = 0, Current = 1	0_b11111111	RW	[P8|P7|P6|P5|P4|P3|P2|P1] Set to 255 for all ports to be current in. Set to 0 for all ports to be voltage in.

Device Port States

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40002	Measurement Value - Analog In 1	0..65535	Voltage = mV, Current = µA	-	RO	-
40003	Measurement Value - Analog In 2	0..65535	Voltage = mV, Current = µA	-	RO	-
40004	Measurement Value - Analog In 3	0..65535	Voltage = mV, Current = µA	-	RO	-
40005	Measurement Value - Analog In 4	0..65535	Voltage = mV, Current = µA	-	RO	-
40006	Measurement Value - Analog In 5	0..65535	Voltage = mV, Current = µA	-	RO	-
40007	Measurement Value - Analog In 6	0..65535	Voltage = mV, Current = µA	-	RO	-
40008	Measurement Value - Analog In 7	0..65535	Voltage = mV, Current = µA	-	RO	-
40009	Measurement Value - Analog In 8	0..65535	Voltage = mV, Current = µA	-	RO	-
40010	Analog Input Active States	0..255	Inactive = 0, Active = 1	-	RO	0_b[P8][P7][P6][P5][P4[P3][P2][P1], where Active for a [P#], signifies that the analog input LED is on, and that the values are between the minimum and maximum setpoints for that port, as defined in registers 40100 to 40139

Analog In - Range Setpoints

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40100	Port 1 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40101	Port 1 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40102	Port 1 - Voltage Hysteresis	0..500	mV	50mV	RW	

Continued on page 5

Continued from page 4

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40103	Port 1 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40104	Port 1 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40105	Port 1 - Current Hysteresis	0..500	µA	100 µA	RW	
40106	Port 2 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40107	Port 2 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40108	Port 2 - Voltage Hysteresis	0..500	mV	50mV	RW	
40109	Port 2 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40110	Port 2 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40111	Port 2 - Current Hysteresis	0..500	µA	100 µA	RW	
40112	Port 3 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40113	Port 3 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40114	Port 3 - Voltage Hysteresis	0..500	mV	50mV	RW	
40115	Port 3 - CurrentMinimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40116	Port 3 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40117	Port 3 - Current Hysteresis	0..500	µA	100 µA	RW	
40118	Port 4 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40119	Port 4 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40120	Port 4 - Voltage Hysteresis	0..500	mV	50mV	RW	
40121	Port 4 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40122	Port 4 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40123	Port 4 - Current Hysteresis	0..500	µA	100 µA	RW	
40124	Port 5 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-

Continued on page 6

Continued from page 5

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40125	Port 5 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40126	Port 5 - Voltage Hysteresis	0..500	mV	50mV	RW	
40127	Port 5 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40128	Port 5 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40129	Port 5 - Current Hysteresis	0..500	µA	100 µA	RW	
40130	Port 6 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40131	Port 6 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40132	Port 6 - Voltage Hysteresis	0..500	mV	50mV	RW	
40133	Port 6 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40134	Port 6 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40135	Port 6 - Current Hysteresis	0..500	µA	100 µA	RW	
40136	Port 7 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40137	Port 7 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40138	Port 7 - Voltage Hysteresis	0..500	mV	50mV	RW	
40139	Port 7 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40140	Port 7 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max
40141	Port 7 - Current Hysteresis	0..500	µA	100 µA	RW	
40142	Port 8 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
40143	Port 8 - Voltage Maximum LED setpoint value	0..11000	Must be greater than the minimum setpoint.	10000 mV	RW	If the value > Max I/O Range, value = Max
40144	Port 8 - Voltage Hysteresis	0..500	mV	50mV	RW	
40145	Port 8 - Current Minimum LED setpoint value	0..23999	Must be less than the maximum setpoint.	4000 µA	RW	-
40146	Port 8 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 µA	RW	If the value > Max I/O Range, value = Max

Continued on page 7

Continued from page 6

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40147	Port 8 - Current Hysteresis	0..500	µA	100 µA	RW	

ModBus Configuration

Modbus Register Address	Description	I/O Range	Comments	Default	Access
40601	Baud Rate	0 = 9.6k 1 = 19.2k 2 = 38.4k	0 = 9600 1 = 19200 2 = 38400	1	RW
40602	Parity	0 = None 1 = Odd 2 = Even	0 = None 1 = Odd 2 = Even	0	RW
40603	Address	1-257	-	1	RW
40604	Reserved	None	-	-	-
40605	Restore Factory Configuration	0 = No Operation, 1 = Restore	-	-	WO

Device Information

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40606-40615	Banner Name	0..65535	-	Banner Engineering	RO	(9 words/18 characters)
40616-40631	Product Name	0..65535	-	R95C-8UI-MQ	RO	(16 words/32 characters)
40632	Item H	0..65535	814472 split into two 16-bit registers	12	RO	Banner Item Number
40633	Item L	0..65535		28040	RO	-
40634	Serial Number H	0..65535	-	-	RO	Serial Number is split into four 16-bit registers
40635	Serial Number	0..65535	-	-	RO	
40636	Serial Number	0..65535	-	-	RO	
40637	Serial Number L	0..65535	-	-	RO	
40644-40659	User Define Tag	0..65535	User writable space	More Sensors. More Solutions.	RW	(16 words/32 characters)
40680	Discovery	0..1	0 = Disabled, 1 = Enabled	-	RW	Flash all LEDs to find hub
40681	All-Time Run Time H	0..65535	-	-	RO	Upper 16 of 32 bits
40682	All-Time Run Time L	0..65535	-	-	RO	Lower 16 of 32 bits
40683	Resettable Run Time H	0..65535	-	-	RW	Upper 16 of 32 bits
40684	Resettable Run Time L	0..65535	-	-	RW	Lower 16 of 32 bits

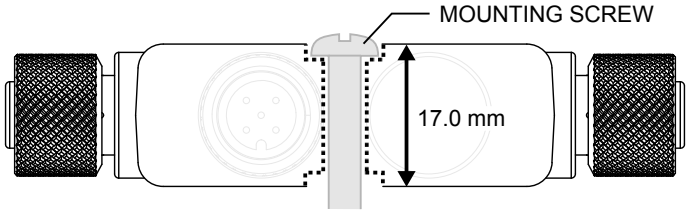
Chapter Contents

Chapter 3 Mechanical Installation

Install the R95C to allow access for functional checks, maintenance, and service or replacement. Do not install the R95C in such a way to allow for intentional defeat.

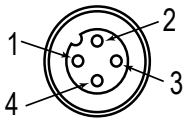
Fasteners must be of sufficient strength to guard against breakage. The use of permanent fasteners or locking hardware is recommended to prevent the loosening or displacement of the device. The mounting hole (4.5 mm) in the R95C accepts M4 (#8) hardware.

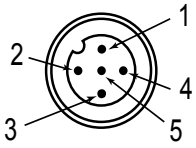
See the figure below to help in determining the minimum screw length.



CAUTION: Do not overtighten the R95C's mounting screw during installation. Overtightening can affect the performance of the R95C.

Wiring

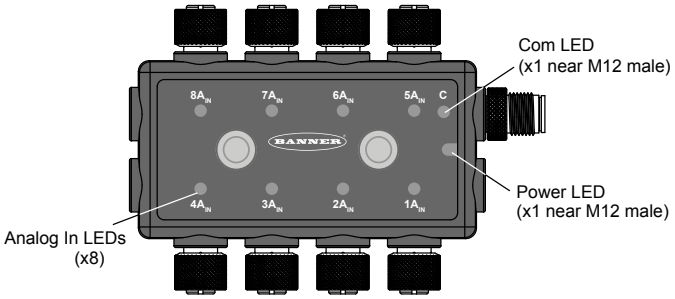
Port 1-Port 8 — Female	Pin	Signal Description
	1	12 V DC to 30 V DC
	2	Analog In
	3	Ground
	4	Not Used

Male	Pin	Signal Description
	1	12 V DC to 30 V DC
	2	RS485/D1/B/+
	3	Ground
	4	RS485/D0/A/-
	5	Banner 1-wire

Chapter Contents

Chapter 4 Status Indicators

The R95C 8-Port Analog In to Modbus® Hub has matching amber LED indicators on both sides for each analog in port to allow for installation needs and still provide adequate indication visibility. There is also an additional amber LED indicator on both sides of the converter, which is specific to the Modbus communication.



Power Indicator Green LED

Indication	Status
Off	Power off
Solid Green	Power on

Modbus Communication Amber LED

Indication	Status
Off	Modbus communications are not present
Flashing Amber (4 Hz)	Modbus communications are active
Solid Amber for 2 Seconds, Then to Off	Modbus communications are lost after connection
Solid Amber for 2 Seconds, Then to Flashing Amber (4 Hz)	Modbus communications momentarily lost, but then communication was reestablished

Analog In Amber LED

Indication	Status
Off	Analog current value is less than the minimum setpoint OR analog value is greater than the maximum setpoint
Solid Amber	Analog current value is between the minimum and maximum setpoints
Default Current Values: • Minimum = 0.004 A • Maximum = 0.02 A	Default Voltage Values: • Minimum = 0 V • Maximum = 10 V

Chapter Contents

Chapter 5 Specifications

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

Power Pass-Through Current
500 mA per port maximum

Analog Input Impedance
Current version: Approximately 250 ohms
Voltage version: Approximately 14.3K ohms

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Leakage Current Immunity
400 µA

Indicators
Green: Power
Amber: Modbus communications
Amber: Analog In status

Connections
(8) Integral 4-pin M12 female quick-disconnect connectors
(1) Integral 5-pin M12 male quick-disconnect connector

Construction
Coupling Material: Nickel-plated brass
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)

Certifications

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

Turck Banner LTD Blenheim House
Blenheim Court
Wickford, Essex SS11 8YT
GREAT BRITAIN

Product Identification

SNAP SIGNAL®

Environmental Rating
IP65, IP67, IP68
UL Type 1

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)

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	1.0	30	0.5

FCC Part 15 Class B for Unintentional Radiators

(Part 15.105(b)) This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(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.

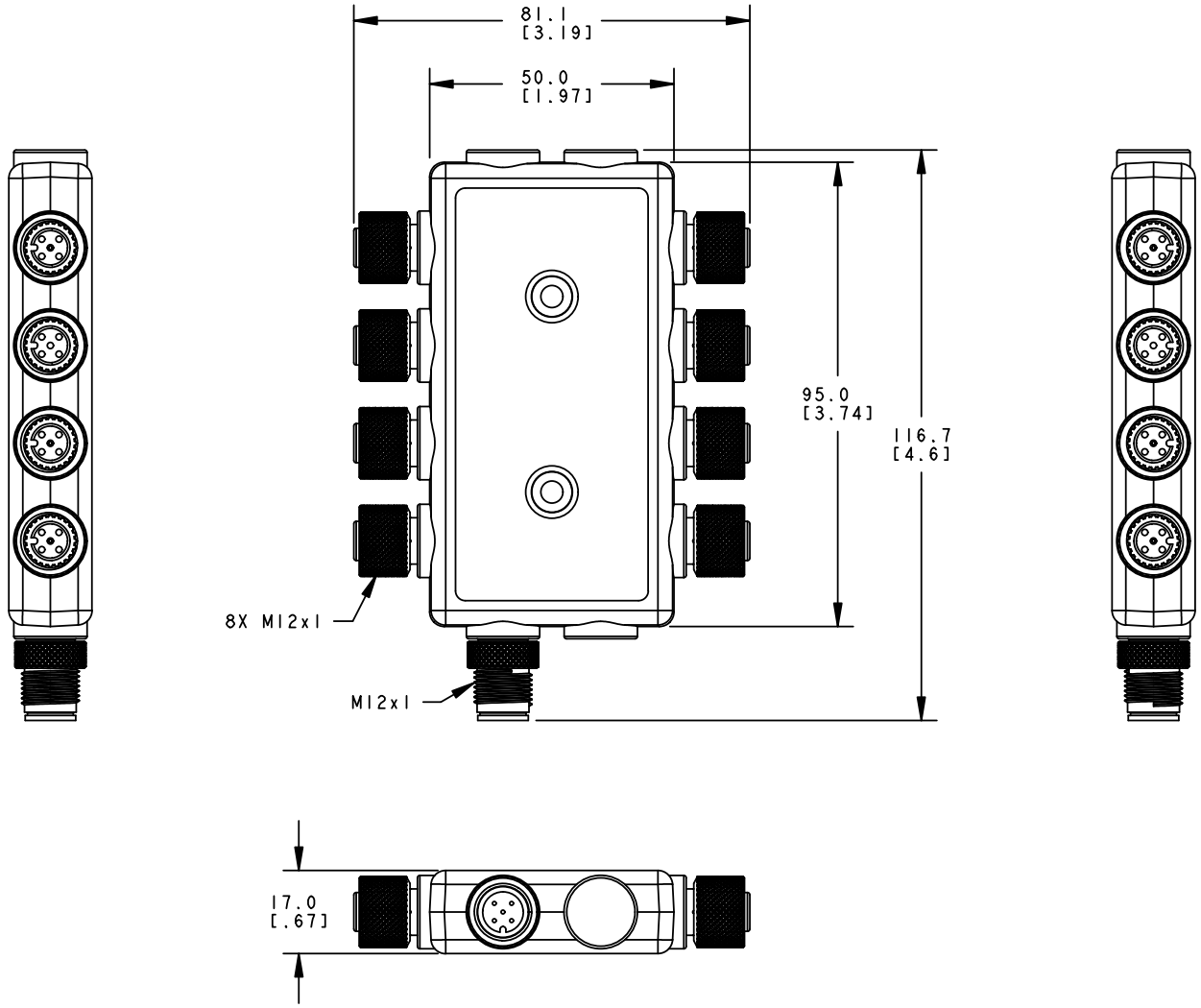
Industry Canada ICES-003(B)

This device complies with CAN ICES-3 (B)/NMB-3(B). 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(B). 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

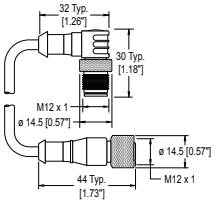
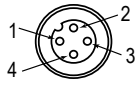
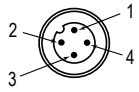
All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.

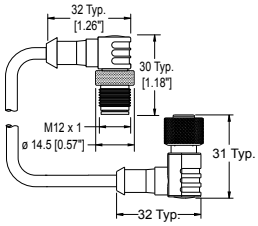
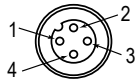
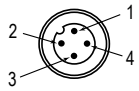


Chapter Contents

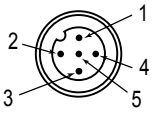
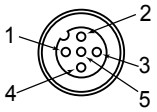
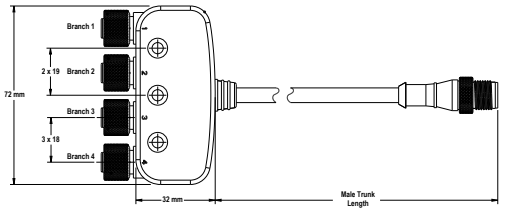
Chapter 6 R95C Accessories

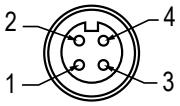
Cordsets

4-pin 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)			

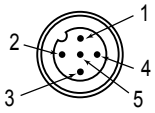
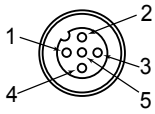
4-pin Double-Ended M12 Female Right-Angle to M12 Male Right-Angle Cordsets				
Model	**Length**	**Dimensions (mm)**	**Pinouts**	
BC-M12F4A-M12M4A-22-1	1 m (3.28 ft)		Female  Male 	1 = Brown 2 = White 3 = Blue 4 = Black
BC-M12F4A-M12M4A-22-2	2 m (6.56 ft)			
BC-M12F4A-M12M4A-22-5	5 m (16.4 ft)			
BC-M12F4A-M12M4A-22-8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

Splitter Cordsets

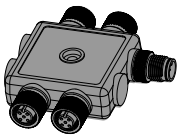
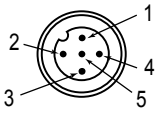
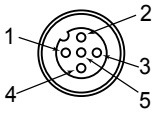
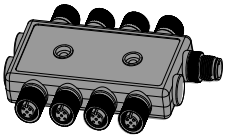
5-Pin Double-Ended M12 Female to M12 Male Flat Junction Splitter Cordsets			
Model	**Description**	**Pinout (Male)**	**Pinout (Female)**
CSB4-M1251M1250	Four (no cable) 5-pin M12 female quick-disconnect connectors One 0.3 m (0.98 ft) cable with a 5-pin M12 male quick-disconnect connector Parallel wiring		
		1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray	1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray

4-Pin M12 Female RS-485 to USB Adapter Cordset, with Wall Plug				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
BWA-UCT-900	1 m (3.28 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black

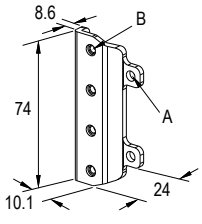
Splitter Tee

5-Pin M12 Female to M12 Male Splitter Tee			
Model		**Pinout (Male)**	**Pinout (Female)**
CSB-M1250M1250-T • Two 5-pin M12 female quick-disconnect connectors • One 5-pin M12 male quick-disconnect connector • Parallel wiring		 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray	 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray

5-Pin Molded Junction Blocks

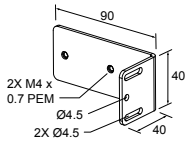
Model		Pinout (Male)	Pinout (Female)
R50-4M125-M125Q-P Molded Junction Block • Four integral 5-pin M12 female quick-disconnect connectors • One integral 5-pin M12 male quick-disconnect connector • Parallel wiring • Product documentation (p/n 227974)		 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray	 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray
R95-8M125-M125Q-P Molded Junction Block • Eight integral 5-pin M12 female quick-disconnect connectors • One integral 5-pin M12 male quick-disconnect connector • Parallel wiring • Product documentation (p/n 227974)			

Brackets

SMBR90S • Stainless steel bracket • 4x M4-07 pemnuts (B) • Includes 2x M4 stainless steel hex head screws and flat washers **Hole center spacing:** A = 40, B = 20 **Hole size:** A = ø 5	

SMBR95RA

- Stainless steel right-angle bracket
- M4 x 0.7 mm #316SS screws (qty 2)



Chapter Contents

Chapter 7 Banner Engineering Corp Limited Warranty

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