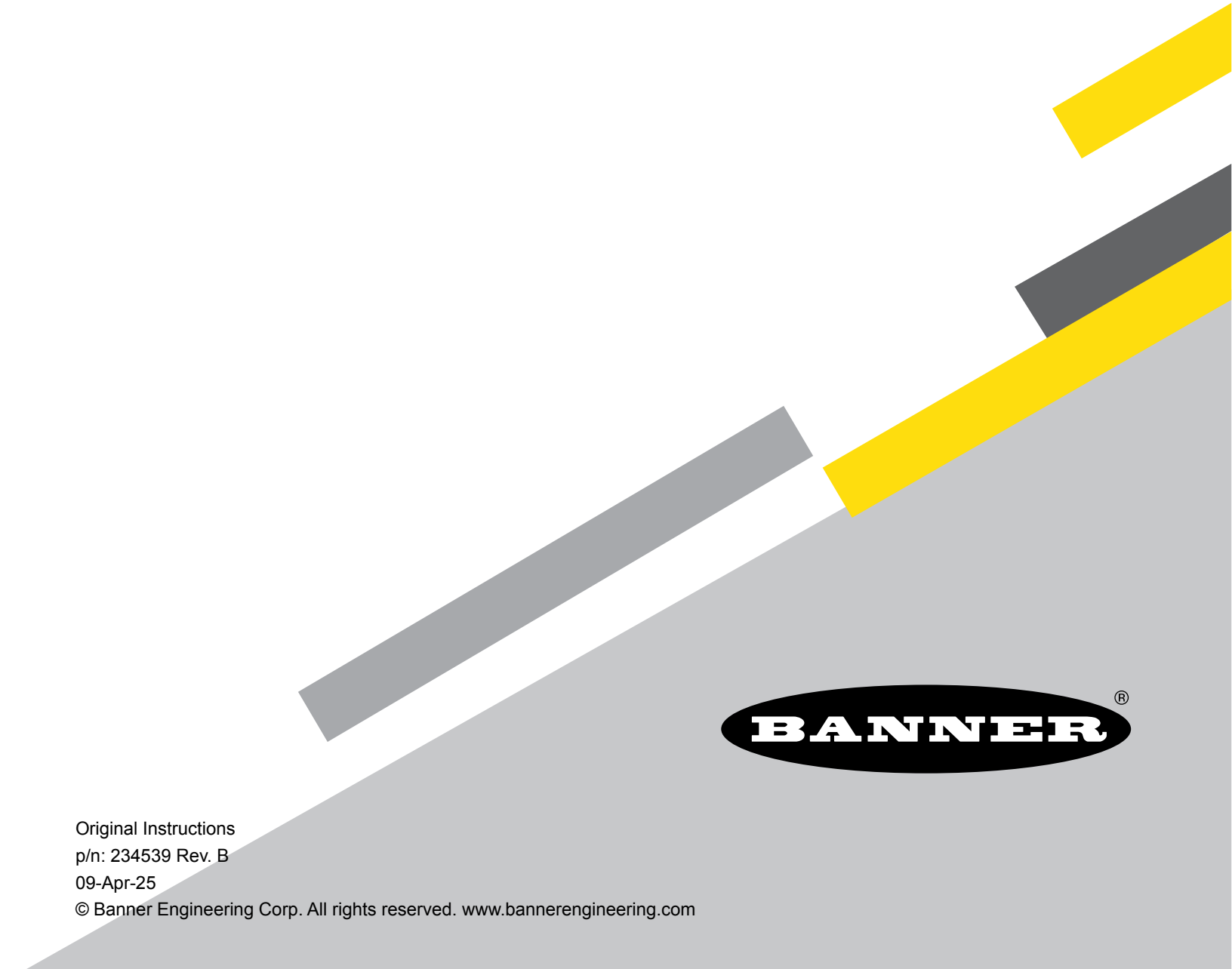
R95C 8-Port 2-Channel Discrete and Analog In-Out Modbus® Hub Product Manual



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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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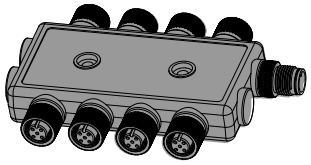
Chapter 1 Features



- Compact Modbus® device converter with the ability to send 4 ports of discrete input and 4 ports of analog input data (voltage or current)
- This Modbus converter can also output discrete values and analog outputs (voltage or current) through any of the respective sets of 4 ports
- 2-Channel Discrete Features:
  - Enabled Delay Modes: ON/OFF Delay, ON/OFF One-shot, ON/OFF Retriggerable One-shot, ON/OFF Pulse-stretcher and Totalizer
  - Measurement Metrics: Count, Counts Per Minute (CPM), and Duration
  - Discrete input/output can be independently configured as NPN or PNP
  - Discrete Mirroring: Discrete signals (In/Out) from the four discrete ports can be mirrored to any of the output channels of the four discrete ports
  - PFM output of 0 Hz to 600 Hz can be selected on either or both discrete output channels
- Analog In/Out Features:
  - Analog Out Mirroring: The analog input from all four analog ports can be mirrored as an output to any of the four analog ports
  - PFM Output: The analog input from all four analog ports can be mirrored as PFM outputs to any of the four discrete ports.
- Rugged overmolded 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

Models

Model Number	Function	Converter Type	Control	Connectors
R95C-4B4UI-MQ	Converter	8-ports: 4B: 4 ports, bimodal discrete input/output 4UI: 4 ports, analog input/output	Modbus®	(8) Integral 4-pin M12 female quick-disconnect connectors (1) Integral 5-pin M12 male quick-disconnect connector

Overview

The R95C 8-Port 2-Channel Discrete and Analog In/Out Modbus® Hub provides a mix of both discrete input/output and analog input/output functionality distributed to two sets of 4-ports

Ports 1 through 4 contain the discrete functionality, and Ports 5 through 8 contain the analog functionality. These two sets of ports can be monitored and configured using an Modbus registers.

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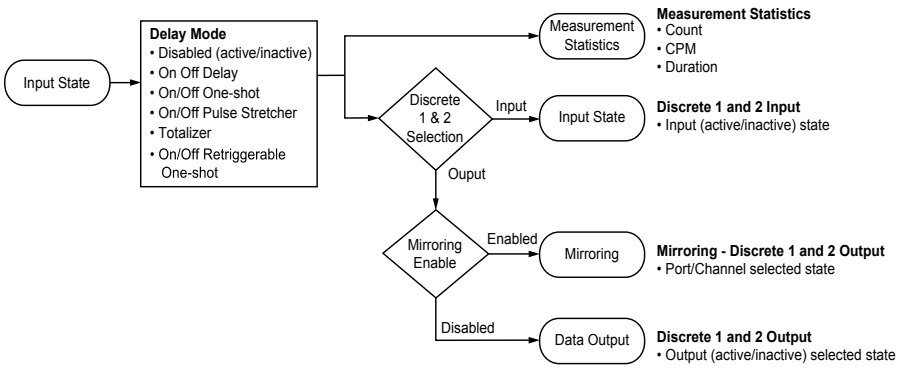
Chapter 2 Configuration Instructions

Discrete In/Out Configuration

Ports 1 through 4 contain discrete functionality. The figure below details the logic flow for each of the four bimodal discrete in/out ports, and the tables define the configuration for each pin of the four bimodal ports.

Logic Flow



Analog In/Out Configuration

Ports 5 through 8 contain analog functionality.

Analog In
When an analog input value is received in Ports 5 through 8, the numerical representational value is sent to Modbus registers.

Analog Input Ranges:

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

Analog Out
Ports 5 through 8 also allow for the user to output an analog value by sending the numerical analog value to Modbus registers

Analog Output Ranges:

- Voltage = 0 mV to 10,000 mV
- Current = 4000 µA to 20,000 µA

Output Outside Valid Range (OOVR)
If the analog output value sent from this converter is outside of the Analog Output Range value, then the actual analog output value will be set to one of the three selectable OOVR levels after a 2-second delay:

- Low (default): 0 V or 3.5 mA
- High: 10.5 V or 20.5 mA
- Hold: Level retains previous value indefinitely

Modbus Configuration

Device Port States

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40001	Active States	0..255	Port 4..Port 1 → Pin 4[P#1] & Pin 2[P#2] Active States	-	RO	0_b[P42|P41|P32|P31|P22|P21|P12|P11]
40002	Analog Input Active States	0..15	Inactive = 0, Active = 1	-	RO	0_b[0|0|0|0|P8|P7|P6|P5]

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Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40003	Measurement Value - Analog In Port 5	0..65535	Voltage = mV, Current = µA	-	RO	-
40004	Measurement Value - Analog In Port 6	0..65535	Voltage = mV, Current = µA	-	RO	-
40005	Measurement Value - Analog In Port 7	0..65535	Voltage = mV, Current = µA	-	RO	-
40006	Measurement Value - Analog In Port 8	0..65535	Voltage = mV, Current = µA	-	RO	-

Analog Port Configuration

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40007	Port 8-5 Analog-Out | Port 8-5 Analog-In	0..255	Voltage = 0, Current = 1	0_b11111111	RW	0_b[P8O|P7O|P6O|P5O] [P8I|P7I|P6I|P5I]

Discrete Output States

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40008	Output States	0..255	Port 4..Port 1 → Pin 4[P#1] & Pin 2[P#2] Output States	0_b00000000	RW	0_b[P42|P41|P32|P31|P22|P21|P12|P11]

Analog Out Value

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40009	Port 5 - Analog Value	0..20500	Voltage = mV, Current = µA	0	RW	Max Voltage = 10000 mV, Max Current = 20000 µA
40010	Port 6 - Analog Value	0..20500	Voltage = mV, Current = µA	0	RW	Max Voltage = 10000 mV, Max Current = 20000 µA
40011	Port 7 - Analog Value	0..20500	Voltage = mV, Current = µA	0	RW	Max Voltage = 10000 mV, Max Current = 20000 µA
40012	Port 8 - Analog Value	0..20500	Voltage = mV, Current = µA	0	RW	Max Voltage = 10000 mV, Max Current = 20000 µA

Alias RO Registers

Modbus Register Address	Description	I/O Range	Comments	Default	Access
40501	Port 5 Analog In	0..65535	Voltage = mV, Current = µA	-	RO
40502	Port 6 Analog In	0..65535	Voltage = mV, Current = µA	-	RO
40503	Port 7 Analog In	0..65535	Voltage = mV, Current = µA	-	RO
40504	Port 8 Analog In	0..65535	Voltage = mV, Current = µA	-	RO
40505	Port 1 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40506	Port 1 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40507	Port 2 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40508	Port 2 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RO

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Modbus Register Address	Description	I/O Range	Comments	Default	Access
40509	Port 3 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40510	Port 3 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40511	Port 4 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40512	Port 4 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RO
40513	Port 1 Pin 4 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40514	Port 1 Pin 4 Count L	0..65535	Port 1 Pin 4 Count Value Lower	-	RO
40515	Port 2 Pin 4 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40516	Port 2 Pin 4 Count L	0..65535	Port 2 Pin 4 Count Value Lower	-	RO
40517	Port 3 Pin 4 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40518	Port 3 Pin 4 Count L	0..65535	Port 3 Pin 4 Count Value Lower	-	RO
40519	Port 4 Pin 4 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40520	Port 4 Pin 4 Count L	0..65535	Port 4 Pin 4 Count Value Lower	-	RO
40521	Port 1 Pin 2 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40522	Port 1 Pin 2 Count L	0..65535	Port 1 Pin 2 Count Value Lower	-	RO
40523	Port 2 Pin 2 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40524	Port 2 Pin 2 Count L	0..65535	Port 2 Pin 2 Count Value Lower	-	RO
40525	Port 3 Pin 2 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40526	Port 3 Pin 2 Count L	0..65535	Port 3 Pin 2 Count Value Lower	-	RO
40527	Port 4 Pin 2 Count H	0..65535	Port 1 Pin 4 Count Value Upper	-	RO
40528	Port 4 Pin 2 Count L	0..65535	Port 4 Pin 2 Count Value Lower	-	RO
40529	Alias Register Value	0..65535	User defined	-	RO
40530	Alias Register Value	0..65535	User defined	-	RO
40531	Alias Register Value	0..65535	User defined	-	RO
40532	Alias Register Value	0..65535	User defined	-	RO

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Alias Read/Only Addresses

Modbus Register Address	Description	I/O Range	Comments	Register to Assign	Access
40701	Alias Register Address	0..65535	Value shows up in 40501	45001	RW
40702	Alias Register Address	0..65535	Value shows up in 40502	46001	RW
40703	Alias Register Address	0..65535	Value shows up in 40503	47001	RW
40704	Alias Register Address	0..65535	Value shows up in 40504	48001	RW
40705	Alias Register Address	0..65535	Value shows up in 40505	41001	RW
40706	Alias Register Address	0..65535	Value shows up in 40506	41002	RW
40707	Alias Register Address	0..65535	Value shows up in 40507	42001	RW
40708	Alias Register Address	0..65535	Value shows up in 40508	42002	RW
40709	Alias Register Address	0..65535	Value shows up in 40509	43001	RW
40710	Alias Register Address	0..65535	Value shows up in 40510	43002	RW
40711	Alias Register Address	0..65535	Value shows up in 40511	44001	RW
40712	Alias Register Address	0..65535	Value shows up in 40512	44002	RW
40713	Alias Register Address	0..65535	Value shows up in 40513	41003	RW
40714	Alias Register Address	0..65535	Value shows up in 40514	41004	RW
40715	Alias Register Address	0..65535	Value shows up in 40515	42003	RW
40716	Alias Register Address	0..65535	Value shows up in 40516	42004	RW
40717	Alias Register Address	0..65535	Value shows up in 40517	43003	RW
40718	Alias Register Address	0..65535	Value shows up in 40518	43004	RW
40719	Alias Register Address	0..65535	Value shows up in 40519	44003	RW
40720	Alias Register Address	0..65535	Value shows up in 40520	44004	RW
40721	Alias Register Address	0..65535	Value shows up in 40521	41011	RW
40722	Alias Register Address	0..65535	Value shows up in 40522	41012	RW
40723	Alias Register Address	0..65535	Value shows up in 40523	42011	RW
40724	Alias Register Address	0..65535	Value shows up in 40524	42012	RW
40725	Alias Register Address	0..65535	Value shows up in 40525	43011	RW
40726	Alias Register Address	0..65535	Value shows up in 40526	43012	RW

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Modbus Register Address	Description	I/O Range	Comments	Register to Assign	Access
40727	Alias Register Address	0..65535	Value shows up in 40527	44011	RW
40728	Alias Register Address	0..65535	Value shows up in 40528	44012	RW
40729	Alias Register Address	0..65535	Value shows up in 40529	0	RW
40730	Alias Register Address	0..65535	Value shows up in 40530	0	RW
40731	Alias Register Address	0..65535	Value shows up in 40531	0	RW
40732	Alias Register Address	0..65535	Value shows up in 40532	0	RW

Alias RW Registers

Modbus Register Address	Description	I/O Range	Comments	Default	Access
40801	Port 1 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40802	Port 1 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40803	Port 2 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40804	Port 2 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40805	Port 3 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40806	Port 3 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40807	Port 4 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40808	Port 4 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RW
40809	Port 5 Analog Out	0..65535	Voltage = mV, Current = µA	-	RW
40810	Port 6 Analog Out	0..65535	Voltage = mV, Current = µA	-	RW
40811	Port 7 Analog Out	0..65535	Voltage = mV, Current = µA	-	RW
40812	Port 8 Analog Out	0..65535	Voltage = mV, Current = µA	-	RW
40813	Alias RW Register Value	0..65535	User defined	-	RW
40814	Alias RW Register Value	0..65535	User defined	-	RW
40815	Alias RW Register Value	0..65535	User defined	-	RW
40816	Alias RW Register Value	0..65535	User defined	-	RW
40817	Alias RW Register Value	0..65535	User defined	-	RW
40818	Alias RW Register Value	0..65535	User defined	-	RW
40819	Alias RW Register Value	0..65535	User defined	-	RW
40820	Alias RW Register Value	0..65535	User defined	-	RW

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Modbus Register Address	Description	I/O Range	Comments	Default	Access
40821	Alias RW Register Value	0..65535	User defined	-	RW
40822	Alias RW Register Value	0..65535	User defined	-	RW
40823	Alias RW Register Value	0..65535	User defined	-	RW
40824	Alias RW Register Value	0..65535	User defined	-	RW
40825	Alias RW Register Value	0..65535	User defined	-	RW
40826	Alias RW Register Value	0..65535	User defined	-	RW
40827	Alias RW Register Value	0..65535	User defined	-	RW
40828	Alias RW Register Value	0..65535	User defined	-	RW
40829	Alias RW Register Value	0..65535	User defined	-	RW
40830	Alias RW Register Value	0..65535	User defined	-	RW
40831	Alias RW Register Value	0..65535	User defined	-	RW
40832	Alias RW Register Value	0..65535	User defined	-	RW

Alias Read/Write Addresses

Modbus Register Address	Description	I/O Range	Comments	Register to Assign	Access
40901	Alias Register Address	0..65535	Value shows up in 40801	41401	RW
40902	Alias Register Address	0..65535	Value shows up in 40802	41402	RW
40903	Alias Register Address	0..65535	Value shows up in 40803	42401	RW
40904	Alias Register Address	0..65535	Value shows up in 40804	42402	RW
40905	Alias Register Address	0..65535	Value shows up in 40805	43401	RW
40906	Alias Register Address	0..65535	Value shows up in 40806	43402	RW
40907	Alias Register Address	0..65535	Value shows up in 40807	44401	RW
40908	Alias Register Address	0..65535	Value shows up in 40808	44402	RW
40909	Alias Register Address	0..65535	Value shows up in 40809	45002	RW
40910	Alias Register Address	0..65535	Value shows up in 40810	46002	RW
40911	Alias Register Address	0..65535	Value shows up in 40811	47002	RW
40912	Alias Register Address	0..65535	Value shows up in 40812	48002	RW

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Modbus Register Address	Description	I/O Range	Comments	Register to Assign	Access
40913	Alias Register Address	0..65535	Value shows up in 40813	0	RW
40914	Alias Register Address	0..65535	Value shows up in 40814	0	RW
40915	Alias Register Address	0..65535	Value shows up in 40815	0	RW
40916	Alias Register Address	0..65535	Value shows up in 40816	0	RW
40917	Alias Register Address	0..65535	Value shows up in 40817	0	RW
40918	Alias Register Address	0..65535	Value shows up in 40818	0	RW
40919	Alias Register Address	0..65535	Value shows up in 40819	0	RW
40920	Alias Register Address	0..65535	Value shows up in 40820	0	RW
40921	Alias Register Address	0..65535	Value shows up in 40821	0	RW
40922	Alias Register Address	0..65535	Value shows up in 40822	0	RW
40923	Alias Register Address	0..65535	Value shows up in 40823	0	RW
40924	Alias Register Address	0..65535	Value shows up in 40824	0	RW
40925	Alias Register Address	0..65535	Value shows up in 40825	0	RW
40926	Alias Register Address	0..65535	Value shows up in 40826	0	RW
40927	Alias Register Address	0..65535	Value shows up in 40827	0	RW
40928	Alias Register Address	0..65535	Value shows up in 40828	0	RW
40929	Alias Register Address	0..65535	Value shows up in 40829	0	RW
40930	Alias Register Address	0..65535	Value shows up in 40830	0	RW
40931	Alias Register Address	0..65535	Value shows up in 40831	0	RW
40932	Alias Register Address	0..65535	Value shows up in 40832	0	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	1-254	-	1	RW
40604	Reserved (cannot be read or written)	None	-	-	-

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Modbus Register Address	Description	I/O Range	Comments	Default	Access
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-4B4UI-MQ	RO	(16 words/32 characters)
40632	Item H	0..65535	814993 split into two 16-bit registers	12	RO	Banner Item Number
40633	Item L	0..65535		28561	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	Run counter (0.25 hr)	-	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	Run counter (0.25 hr)	-	RW	Lower 16 of 32 bits

Multi-Port Support: Ports 1-4

Register Ranges for Ports 1-4

Register Ranges	Port Number
41001-41400	Port 1
42001-42400	Port 2
43001-43400	Port 3
44001-44400	Port 4

Measurement Reads

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41001	Port 1 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	-	RO	-
41002	Port 1 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	-	RO	-
41003	Pin 4 Count H	0..65535	Pin 4 Count Value Upper	-	RO	Upper 16 of 32 bits = Running count of the received input pulses

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Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41004	Pin 4 Count L	0..65535	Pin 4 Count Value Lower	-	RO	Lower 16 of 32 bits = Running count of the received input pulses
41005	Pin 4 Duration H	0..65535	Pin 4 Duration Value Upper	-	RO	Upper 16 of 32 bits = Duration of the last input pulse in µs with 50 µs granularity
41006	Pin 4 Duration L	0..65535	Pin 4 Duration Value Lower	-	RO	Lower 16 of 32 bits = Duration of the last input pulse in µs with 50 µs granularity
41007	Pin 4 Counts Per Minute H	0..65535	Pin 4 Counts Per Minute Value Upper	-	RO	Upper 16 of 32 bits = Running count of the number of pulses received averaged over one minute. Range 1 to 37,500
41008	Pin 4 Counts Per Minute L	0..65535	Pin 4 Counts Per Minute Value Lower	-	RO	Lower 16 of 32 bits = Running count of the number of pulses received averaged over one minute. Range 1 to 37,500
41009	Pin 4 Totalizer Count H	0..65535	Pin 4 Totalizer Count Upper	-	RO	Upper 16 of 32 bits = Totalizer count
41010	Pin 4 Totalizer Count L	0..65535	Pin 4 Totalizer Count Lower	-	RO	Lower 16 of 32 bits = Totalizer count
41011	Pin 2 Count H	0..65535	Pin 2 Count Value Upper	-	RO	Upper 16 of 32 bits = Running count of the received input pulses
41012	Pin 2 Count L	0..65535	Pin 2 Count Value Lower	-	RO	Lower 16 of 32 bits = Running count of the received input pulses
41013	Pin 2 Duration H	0..65535	Pin 2 Duration Value Upper	-	RO	Upper 16 of 32 bits = Duration of the last input pulse in µs with 50 µs granularity
41014	Pin 2 Duration L	0..65535	Pin 2 Duration Value Lower	-	RO	Lower 16 of 32 bits = Duration of the last input pulse in µs with 50 µs granularity
41015	Pin 2 Counts Per Minute H	0..65535	Pin 2 Counts Per Minute Value Upper	-	RO	Upper 16 of 32 bits = Running count of the number of pulses received averaged over one minute. Range 1 to 37,500
41016	Pin 2 Counts Per Minute L	0..65535	Pin 2 Counts Per Minute Value Lower	-	RO	Lower 16 of 32 bits = Running count of the number of pulses received averaged over one minute. Range 1 to 37,500
41017	Pin 2 Totalizer Count H	0..65535	Pin 2 Totalizer Count Upper	-	RO	Upper 16 of 32 bits = Totalizer count
41018	Pin 2 Totalizer Count L	0..65535	Pin 2 Totalizer Count Lower	-	RO	Lower 16 of 32 bits = Totalizer count

Measurement Count Presets: these registers reset ALL measurements, not just the count values

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41100	Pin 4 Count H	0..65535	Pin 4 Count Value Upper	-	RW	Upper 16 of 32 bits
41101	Pin 4 Count L	0..65535	Pin 4 Count Value Lower	-	RW	Lower 16 of 32 bits
41102	Pin 2 Count H	0..65535	Pin 2 Count Value Upper	-	RW	Upper 16 of 32 bits

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Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41103	Pin 2 Count L	0..65535	Pin 2 Count Value Lower	-	RW	Lower 16 of 32 bits

Pin 4 Port Configuration (Black - Female, Discrete 1)

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41200	Pin 4 IO Selection	0..5	0 = NPN input 1 = PNP input 2 = NPN output with pull up 3 = PNP output with pull down 4 = NPN output push/pull 5 = PNP output push/pull	3	RW	-
41201	Pin 4 Mode	0..8	0 = Disabled 1 = On Off Delay 2 = On One-shot 3 = Off One-shot 4 = On Pulse-stretcher 5 = Off Pulse-stretcher 6 = Totalizer 7 = Retriggerable On One-shot 8 = Retriggerable Off One-shot 9 = PFM	0	RW	-
41202	Pin 4 Delay Timer 1 Upper	0..65535	Pin 4 On Delay, One-shot, Pulse-stretcher time, Totalizer Count	0	RW	Upper 16 of 32 Bits: Mode 1, 2, 3, 4, 5, 7, 8 = Milliseconds Mode 6 = Count
41203	Pin 4 Delay Timer 1 Lower	0..65535	Pin 4 On Delay, One-shot, Pulse-stretcher time, Totalizer Count	0	RW	Lower 16 of 32 Bits: Mode 1, 2, 3, 4, 5, 7, 8 = Milliseconds Mode 6 = Count
41204	Pin 4 Delay Timer 2 Upper	0..65535	Pin 4 Off Delay or Totalizer time	0	RW	Upper 16 of 32 Bits = Milliseconds
41205	Pin 4 Delay Timer 2 Lower	0..65535	Pin 4 Off Delay or Totalizer time	0	RW	Lower 16 of 32 Bits = Milliseconds
41206	Pin 4 Mirroring Enable	0..1	0 = Disabled, 1 = Enabled	0	RW	-
41207	Pin 4 Mirroring Port Selection	0..7	0 = Port 1 1 = Port 2 2 = Port 3 3 = Port 4 4 = Port 5 5 = Port 6 6 = Port 7 7 = Port 8	0	RW	If Port 1-4, Discrete Mirroring If Port 5-8, PFM of Analog In
41208	Pin 4 Mirroring Selection	0..1	0 = Channel 1, 1 = Channel 2	0	RW	If Port 1-4, Discrete Mirroring
41209	Pin 4 Mirroring Inversion	0..1	0 = Not inverted, 1 = Inverted	0	RW	If Port 1-4, Discrete Mirroring
41210	Pin 4 PFM Near Frequency (Hz)	100..600	-	100	RW	If Port 5-8, PFM of Analog In
41211	Pin 4 PFM Far Frequency (Hz)	100..600	-	600	RW	If Port 5-8, PFM of Analog In
41212	Pin 4 PFM Out	0..600	-	100	RW	PFM Output

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Pin 2 Port Configuration (White - Female, Discrete 2)

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41300	Pin 2 IO Selection	0..5	0 = NPN input 1 = PNP input 2 = NPN output with pull up 3 = PNP output with pull down 4 = NPN output push/pull 5 = PNP output push/pull	3	RW	-
41301	Pin 2 Mode	0..6	0 = Disabled 1 = On Off Delay 2 = On One-shot 3 = Off One-shot 4 = On Pulse-stretcher 5 = Off Pulse-stretcher 6 = Totalizer 7 = Retriggerable On One-shot 8 = Retriggerable Off One-shot 9 = PFM	0	RW	-
41302	Pin 2 Delay Timer 1 Upper	0..65535	Pin 2 On Delay, One-shot, Pulse-stretcher time, or Totalizer Count	0	RW	Upper 16 of 32 Bits: Mode 1, 2, 3, 4, 5, 7, 8 = Milliseconds Mode 6 = Count
41303	Pin 2 Delay Timer 1 Lower	0..65535	Pin 2 On Delay, One-shot, Pulse-stretcher time, or Totalizer Count	0	RW	Lower 16 of 32 Bits: Mode 1, 2, 3, 4, 5, 7, 8 = Milliseconds Mode 6 = Count
41304	Pin 2 Delay Timer 2 Upper	0..65535	Pin 2 Off Delay or Totalizer time	0	RW	Upper 16 of 32 Bits = Milliseconds
41305	Pin 2 Delay Timer 2 Lower	0..65535	Pin 2 Off Delay or Totalizer time	0	RW	Lower 16 of 32 Bits = Milliseconds
41306	Pin 2 Mirroring Enable	0..1	0 = Disabled, 1 = Enabled	0	RW	-
41307	Pin 2 Mirroring Port Selection	0..7	0 = Port 1 1 = Port 2 2 = Port 3 3 = Port 4 4 = Port 5 5 = Port 6 6 = Port 7 7 = Port 8	0	RW	If Port 1-4, Discrete Mirroring If Port 5-8, PFM of Analog In
41308	Pin 2 Mirroring Selection	0..1	0 = Channel 1, 1 = Channel 2	0	RW	If Port 1-4, Discrete Mirroring
41309	Pin 2 Mirroring Inversion	0..1	0 = Not Inverted, 1 = Inverted	0	RW	If Port 1-4, Discrete Mirroring
41310	Pin 2 PFM Near Frequency (Hz)	100..600	-	100	RW	If Port 5-8, PFM of Analog In
41311	Pin 2 PFM Far Frequency (Hz)	100..600	-	600	RW	If Port 5-8, PFM of Analog In
41312	Pin 2 PFM Out	0..600	-	100	RW	PFM Output

Active Configurations

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41401	Port 1 Pin 4 Active State	0..1	0 = Inactive, 1 = Active	0	RW	If mirroring disabled & IO selection is output, Data Output set to inactive/active
41402	Port 1 Pin 2 Active State	0..1	0 = Inactive, 1 = Active	0	RW	If mirroring disabled & IO selection is output, Data Output set to inactive/active

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Multi-Port Support: Ports 5-8

Register Ranges for Ports 5-8

Register Ranges	Port Number
45001-45305	Port 5
46001-46305	Port 6
47001-47305	Port 7
48001-48305	Port 8

Measurement Reads

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
45001	Measurement Value - Analog In Port 5	0..65535	Voltage = mV, Current = µA	-	RO	-
45002	Port 5 - Analog Out	0..20500	Voltage = mV, Current = µA	0	RW	Voltage = 10000 mV, Current = 20000 µA

Port Output Configuration (Black - Channel 1)

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
45200	Port 5 - Mirroring Output Enable	0..1	0 = Disabled, 1 = Enabled	0	RW	If Enabled, Analog Out value in register 40009 will be ignored
45201	Port 5 - Mirroring Input Port Selection	0..1	0 = Port 5 1 = Port 6 2 = Port 7 3 = Port 8	0	RW	-
45202	Port 5 - Output Outside of Valid Range	0..2	0 = Hold, 1 = Low, 2 = High	1	RW	-

Port Output Configuration (White - Channel 2)

Modbus Register Address	Description	I/O Range	Comments	Default	Access	Notes
45300	Port 5 - Voltage Minimum LED setpoint value	0..9999	Must be less than maximum.	V = 0 mV	RW	-
45301	Port 5 - Voltage Maximum LED setpoint value	0..10000	Must be greater than minimum.	V = 10000 mV	RW	If value > Max I/O Range, value = Max
45302	Port 5 - Voltage Hysteresis	0..500	mV	V = 50 mV	RW	If value > Max I/O Range, value = Max
45303	Port 5 - Current Minimum LED setpoint value	0..19999	Must be less than maximum.	4000 µA	RW	-
45304	Port 5 - Current Maximum LED setpoint value	0..20000	Must be greater than minimum.	20000 µA	RW	If value > Max I/O Range, value = Max
45305	Port 5 - Current Hysteresis	0..500	µA	100 µA	RW	If value > Max I/O Range, value = Max

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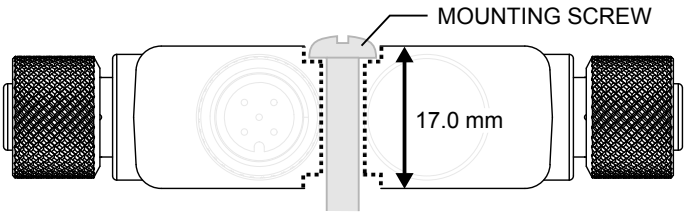
Wiring 16

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.

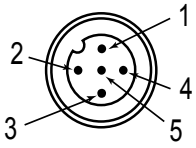
Fasteners must be of sufficient strength to guard against breakage. The use of permanent fasteners or locking hardware is recommended to prevent the loosening or displacement of the device. The mounting hole (4.5 mm) in the R95C accepts M4 (#8) hardware.

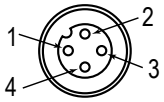
See the figure below to help in determining the minimum screw length.

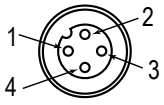


CAUTION: Do not overtighten the R95C's mounting screw during installation. Overtightening can affect the performance of the R95C.

Wiring

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

Port 1-Port 4 — Female	Pin	Signal Description
	1	12 V DC to 30 V DC
	2	Discrete 2 (IN/OUT)
	3	Ground
	4	Discrete 1 (IN/OUT)

Port 5-Port 8 — Female	Pin	Signal Description
	1	12 V DC to 30 V DC
	2	Analog In
	3	Ground
	4	Analog Out

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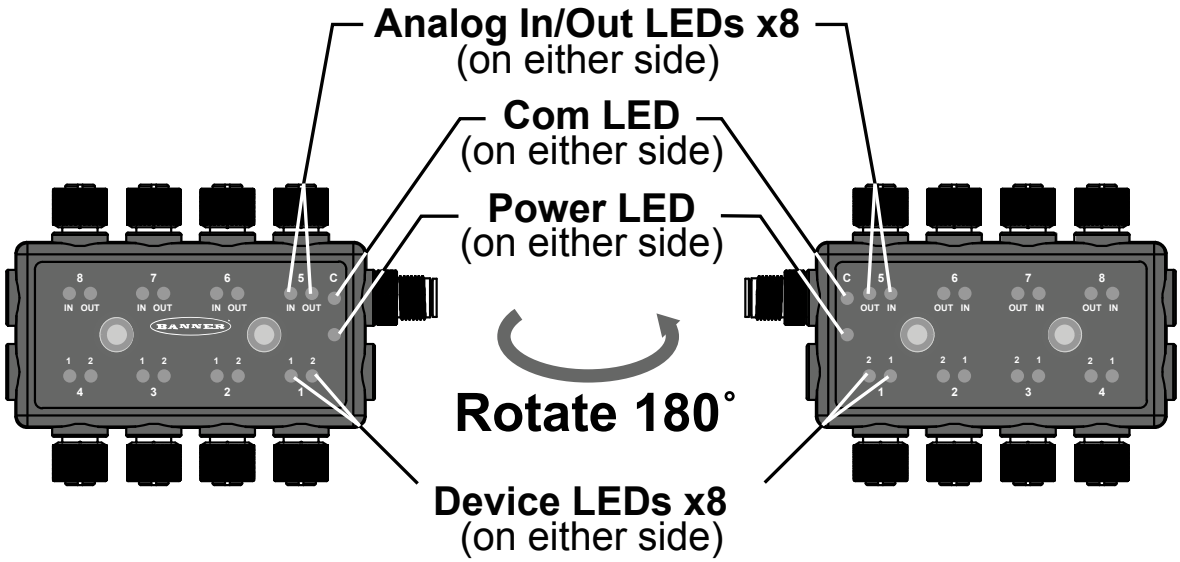
Chapter 4 Status Indicators

On both sides of the R95C Modbus hub, Ports 1 through 4 have two matching amber LED discrete output indicators, and Ports 5 through 8 have two matching amber LED analog in/analog out indicators. There is also an additional amber LED indicator on both sides of the converter, which is specific to the Modbus communication, and a green LED indicator that shows power status.



LED 1 = Discrete 1 In/Out
LED 2 = Discrete 2 In/Out

LED	Indication	Status
Discrete Device Amber LEDs	Off	Discrete In and Out are inactive
	Solid Amber	Discrete In or Out is active
Analog In Amber LED[1]	Off	Analog current value is less than setpoint one OR analog value is greater than setpoint two
	Solid Amber	Analog current value is between setpoint one AND setpoint two
Analog Out Amber LED	Off	Turns off if written PDO analog value is outside the allowable output range **Allowable Voltage Range:** 0 V to 10 V. **Allowable Current Range:** 4 mA to 20 mA.
	Solid Amber	Turns on if written PDO analog value is inside the allowable output range **Allowable Voltage Range:** 0 V to 10 V. **Allowable Current Range:** 4 mA to 20 mA.
Modbus Communication Amber LED	Off	Modbus communications are not present

Continued on page 18

[1] **Default Current Values:** SP1 = 0.004 A, SP2 = 0.02 A. **Default Voltage values:** SP1 = 0 V, SP2 = 10 V.

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Continued from page 17

LED	Indication	Status
	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
Power Indicator Green LED	Off	Power off
	Solid Green	Power on

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FCC Part 15 Class B for Unintentional Radiators 19
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Dimensions 20

Chapter 5 Specifications

Supply Voltage
12 V DC to 30 V DC at 400 mA maximum (exclusive of load)

Power Pass-Through Current
Not to exceed 4 amps total

Discrete Output Load Rating
200 mA

Analog Input Impedance
Current version: Approximately 250 Ω
Voltage version: Approximately 14.3k Ω

Analog Output Load Requirements
Voltage version = Resistance > 1000 Ω
Current version = Resistance < 500 Ω

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Leakage Current Immunity
400 µA

Indicators
Green: Power
Amber: Modbus communications
Amber: 2x Discrete IN/OUT status
Amber: Analog input value present
Amber: Analog output value in range

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)

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

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®

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.

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- 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.

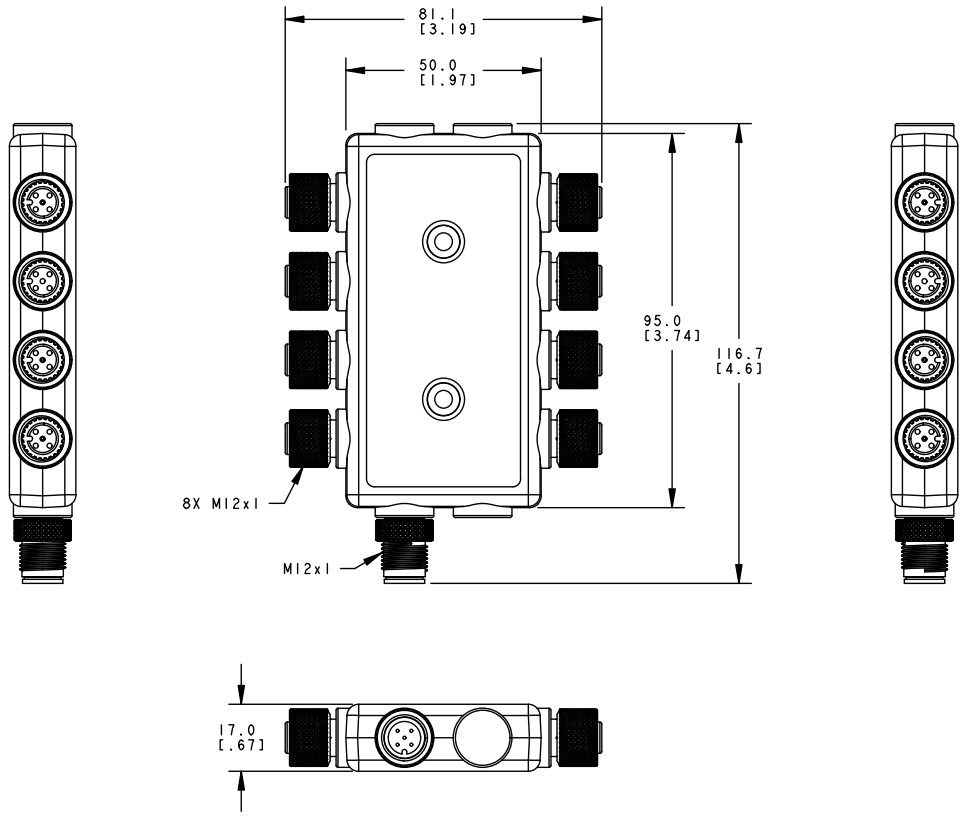
Industry Canada ICES-003(B)

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.



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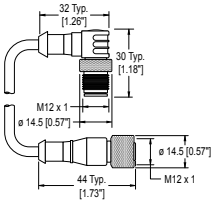
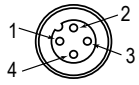
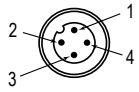
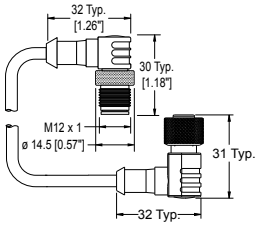
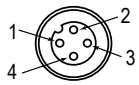
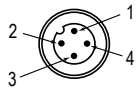
Chapter Contents

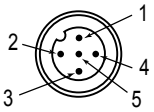
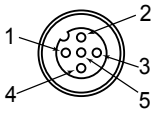
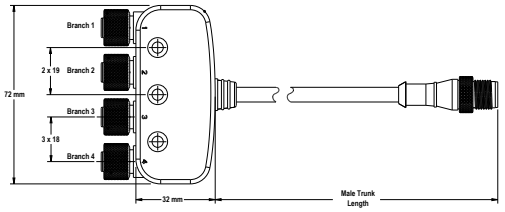
Chapter 6 Accessories

Cordsets

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)			

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

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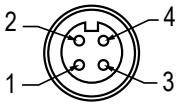
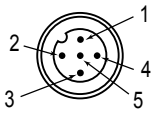
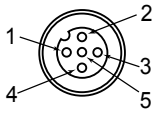
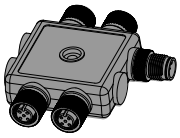
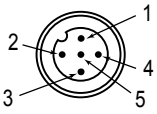
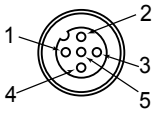
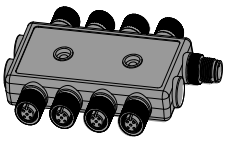
4-Pin M12 Female RS-485 to USB Adapter Cordset, with Wall Plug				
Model	**Length**	**Style**	**Dimensions**	**Pinout (Female)**
BWA-UCT-900	1 m (3.28 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black

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

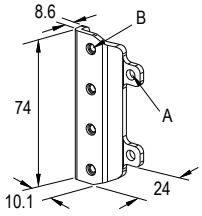
Model		Pinout (Male)	Pinout (Female)
R50-4M125-M125Q-P Molded Junction Block • Four integral 5-pin M12 female quick-disconnect connectors • One integral 5-pin M12 male quick-disconnect connector • Parallel wiring • Product documentation (p/n 227974)		 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray	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



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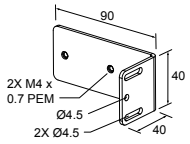
SMBR95RA

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



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Chapter 7 Product Support and Maintenance

Clean with Mild Detergent and Water

Wipe down the device with a soft cloth that has been dampened with a mild detergent and warm water solution.

Repairs

Contact Banner Engineering for troubleshooting of this device. **Do not attempt any repairs to this Banner device; it contains no field-replaceable parts or components.** If the device, device part, or device component is determined to be defective by a Banner Applications Engineer, they will advise you of Banner's RMA (Return Merchandise Authorization) procedure.

> **IMPORTANT:** If instructed to return the device, pack it with care. Damage that occurs in return shipping is not covered by warranty.

Contact Us

Banner Engineering Corp. headquarters is located at: 9714 Tenth Avenue North | Plymouth, MN 55441, USA | Phone: + 1 888 373 6767

For worldwide locations and local representatives, visit www.bannerengineering.com.

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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