

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



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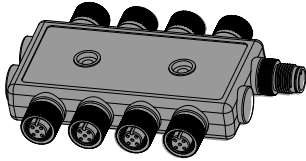
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Chapter 1 Features



- 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

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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 _b 11111111 | 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 | |

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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 μ A | RW | - |
| 40104 | Port 1 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40105 | Port 1 - Current Hysteresis | 0..500 | μ A | 100 μ A | 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 μ A | RW | - |
| 40110 | Port 2 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40111 | Port 2 - Current Hysteresis | 0..500 | μ A | 100 μ A | 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 - Current Minimum LED setpoint value | 0..23999 | Must be less than the maximum setpoint. | 4000 μ A | RW | - |
| 40116 | Port 3 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40117 | Port 3 - Current Hysteresis | 0..500 | μ A | 100 μ A | 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 μ A | RW | - |
| 40122 | Port 4 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40123 | Port 4 - Current Hysteresis | 0..500 | μ A | 100 μ A | RW | |
| 40124 | Port 5 - Voltage Minimum LED setpoint value | 0..10999 | Must be less than the maximum setpoint. | 0 mV | RW | - |

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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 μ A | RW | - |
| 40128 | Port 5 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40129 | Port 5 - Current Hysteresis | 0..500 | μ A | 100 μ A | 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 μ A | RW | - |
| 40134 | Port 6 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40135 | Port 6 - Current Hysteresis | 0..500 | μ A | 100 μ A | 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 μ A | RW | - |
| 40140 | Port 7 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |
| 40141 | Port 7 - Current Hysteresis | 0..500 | μ A | 100 μ A | 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 μ A | RW | - |
| 40146 | Port 8 - Current Maximum LED setpoint value | 0..24000 | Must be greater than the minimum setpoint. | 20000 μ A | RW | If the value > Max I/O Range, value = Max |

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| 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 |

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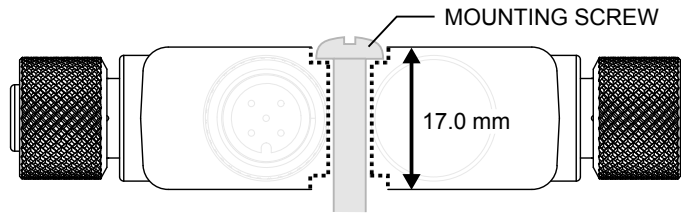
Wiring 8

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

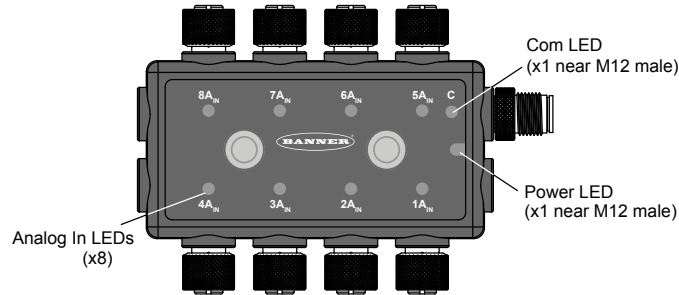
| Port 1-Port 8 — Female | Pin | Signal Description |
|------------------------|-----|--------------------|
| | 1 | 12 V DC to 30 V DC |
| | 2 | Analog In |
| | 3 | Ground |
| | 4 | Not Used |

| 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 |

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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: <ul style="list-style-type: none"> • Minimum = 0.004 A • Maximum = 0.02 A | Default Voltage Values: <ul style="list-style-type: none"> • Minimum = 0 V • Maximum = 10 V |

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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



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.

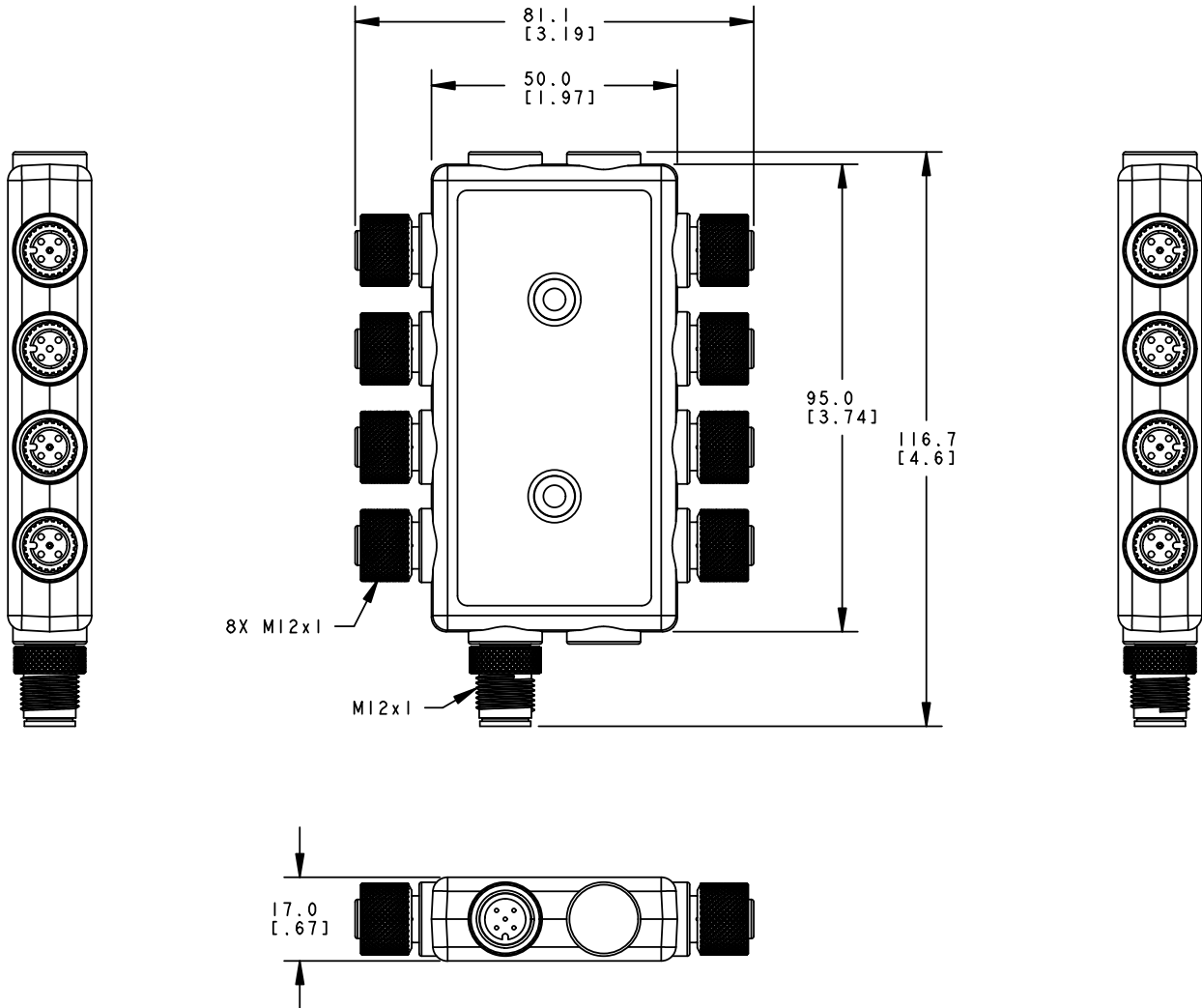
Industry Canada ICES-003(B)

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.



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Chapter 6 R95C Accessories


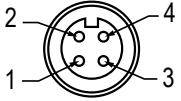
Cordsets

| 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 | 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) | | Male | |

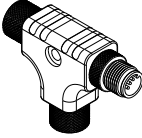
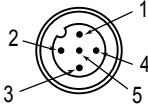
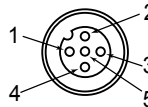
| 4-pin Double-Ended M12 Female Right-Angle to M12 Male Right-Angle Cordsets | | | | |
|--|-----------------|-----------------|---------|---|
| Model | Length | Dimensions (mm) | Pinouts | |
| BC-M12F4A-M12M4A-22-1 | 1 m (3.28 ft) | | Female | 1 = Brown 2 = White 3 = Blue 4 = Black |
| BC-M12F4A-M12M4A-22-2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

Splitter Cordsets

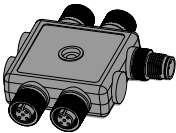
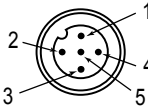
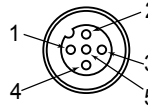
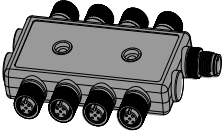
| 5-Pin Double-Ended M12 Female to M12 Male Flat Junction Splitter Cordsets | | | |
|---|--|---|---|
| Model | Description | Pinout (Male) | Pinout (Female) |
| CSB4-M1251M1250 | Four (no cable) 5-pin M12 female quick-disconnect connectors | | |
| | One 0.3 m (0.98 ft) cable with a 5-pin M12 male quick-disconnect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

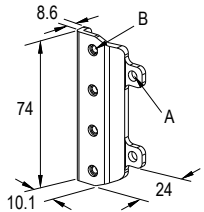
Splitter Tee

| 5-Pin M12 Female to M12 Male Splitter Tee | | | |
|---|---|---|--|
| Model | | Pinout (Male) | Pinout (Female) |
| <p>CSB-M1250M1250-T</p> <ul style="list-style-type: none"> Two 5-pin M12 female quick-disconnect connectors One 5-pin M12 male quick-disconnect connector Parallel wiring |  |  <p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p> |  <p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p> |

5-Pin Molded Junction Blocks

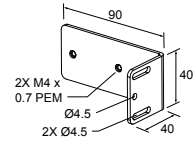
| Model | | Pinout (Male) | Pinout (Female) |
|--|---|--|---|
| <p>R50-4M125-M125Q-P Molded Junction Block</p> <ul style="list-style-type: none"> Four integral 5-pin M12 female quick-disconnect connectors One integral 5-pin M12 male quick-disconnect connector Parallel wiring Product documentation (p/n 227974) |  |  |  |
| <p>R95-8M125-M125Q-P Molded Junction Block</p> <ul style="list-style-type: none"> 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) |  | <p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p> | <p>1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray</p> |

Brackets

| | |
|---|---|
| <p>SMBR90S</p> <ul style="list-style-type: none"> Stainless steel bracket 4x M4-07 pemnuts (B) Includes 2x M4 stainless steel hex head screws and flat washers <p>Hole center spacing: A = 40, B = 20 Hole size: A = \varnothing 5</p> |  |
|---|---|

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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