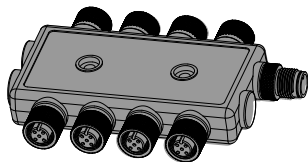


## Features



- 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

## ModBus Configuration

### Analog In Port Type

ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40000	Port Definition	0..255	Voltage = 0, Current = 1	0 <sub>b</sub> 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
40001	Measurement Value - Analog In 1	0..65535	Voltage = mV, Current = µA	-	RO	-
40002	Measurement Value - Analog In 2	0..65535	Voltage = mV, Current = µA	-	RO	-
40003	Measurement Value - Analog In 3	0..65535	Voltage = mV, Current = µA	-	RO	-
40004	Measurement Value - Analog In 4	0..65535	Voltage = mV, Current = µA	-	RO	-
40005	Measurement Value - Analog In 5	0..65535	Voltage = mV, Current = µA	-	RO	-
40006	Measurement Value - Analog In 6	0..65535	Voltage = mV, Current = µA	-	RO	-
40007	Measurement Value - Analog In 7	0..65535	Voltage = mV, Current = µA	-	RO	-
40008	Measurement Value - Analog In 8	0..65535	Voltage = mV, Current = µA	-	RO	-

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ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40009	Analog Input Active States	0..255	Inactive = 0, Active = 1	-	RO	0 <sub>b</sub> [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	
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 - Current Minimum 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

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ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
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 $\mu$ A	RW	-
40122	Port 4 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 $\mu$ A	RW	If the value > Max I/O Range, value = Max
40123	Port 4 - Current Hysteresis	0..500	$\mu$ A	100 $\mu$ A	RW	
40124	Port 5 - Voltage Minimum LED setpoint value	0..10999	Must be less than the maximum setpoint.	0 mV	RW	-
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 $\mu$ A	RW	-
40128	Port 5 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 $\mu$ A	RW	If the value > Max I/O Range, value = Max
40129	Port 5 - Current Hysteresis	0..500	$\mu$ A	100 $\mu$ 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 $\mu$ A	RW	-
40134	Port 6 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 $\mu$ A	RW	If the value > Max I/O Range, value = Max
40135	Port 6 - Current Hysteresis	0..500	$\mu$ A	100 $\mu$ 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 $\mu$ A	RW	-
40140	Port 7 - Current Maximum LED setpoint value	0..24000	Must be greater than the minimum setpoint.	20000 $\mu$ A	RW	If the value > Max I/O Range, value = Max
40141	Port 7 - Current Hysteresis	0..500	$\mu$ A	100 $\mu$ 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

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ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
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
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*

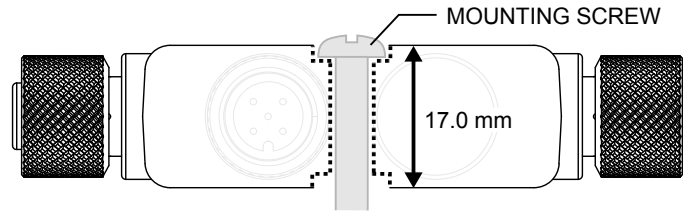
ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40606-40615	Banner Name	0..65535	-	Banner Engineering	RO	(9 words/18 characters)
40616-40631	Product Name	0..65535	-	R95C-8UI-MQ	RO	(16 words/32 characters)
40632	Item H	0..65535	TBD split into two 16-bit registers	12	RO	Banner 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

## 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

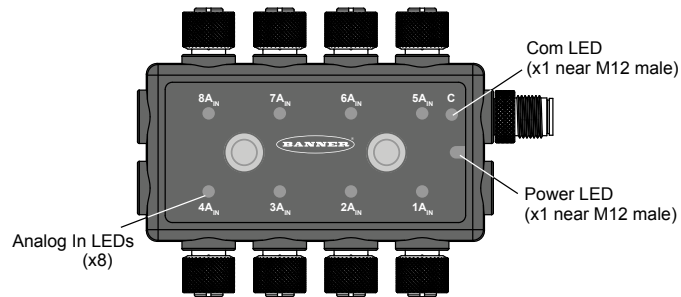
Port 1-Port 8 — Female	Pin	Signal Description
	1	12 V DC to 30 V DC
	2	Analog In
	3	Ground
	4	Not Used

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

## 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 setpoint SP1 OR analog value is greater than setpoint SP2
Solid Amber	Analog current value is between setpoint SP1 AND setpoint SP2
Default Current Values: <ul style="list-style-type: none"> <li>• SP1 = 0.004 A</li> <li>• SP2 = 0.02 A</li> </ul>	Default Voltage Values: <ul style="list-style-type: none"> <li>• SP1 = 0 V</li> <li>• SP2 = 10 V</li> </ul>

## 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 connector

(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](http://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

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.

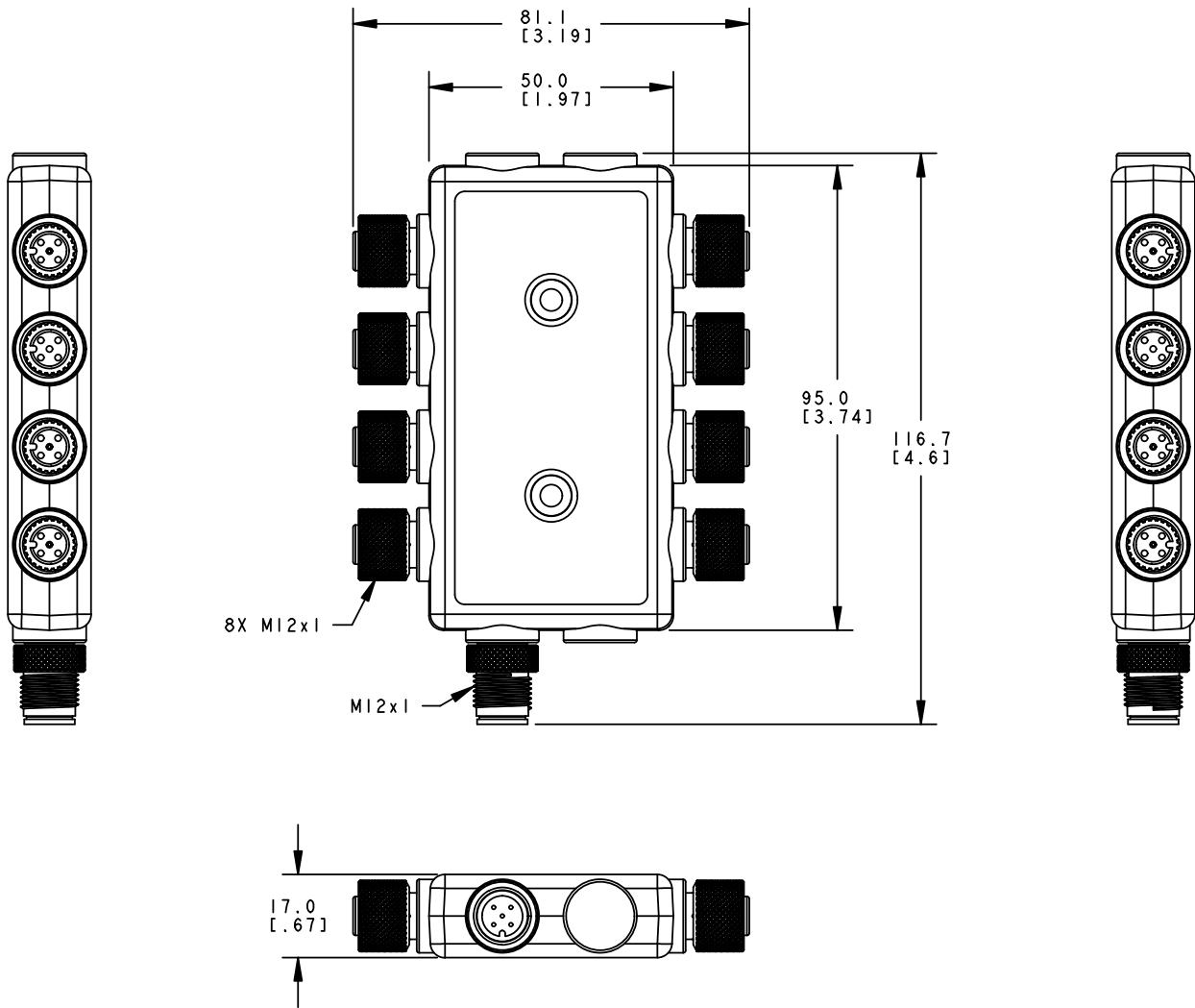
## Industry Canada ICES-003(B)

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.



## Accessories

### Cordsets

4-Pin Threaded M12 Cordsets—Double Ended						
Model	Length	Style	Dimensions	Pinout		
MQDEC-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female		
MQDEC-403SS	0.91 m (2.99 ft)					
MQDEC-406SS	1.83 m (6 ft)					
MQDEC-412SS	3.66 m (12 ft)					<p>1 = Brown 2 = White 3 = Blue 4 = Black</p>
MQDEC-420SS	6.10 m (20 ft)					
MQDEC-430SS	9.14 m (30.2 ft)					
MQDEC-450SS	15.2 m (49.9 ft)					

### Brackets

<p><b>SMBR90S</b></p> <ul style="list-style-type: none"> <li>Stainless steel bracket</li> <li>4x M4-07 pemnuts (B)</li> <li>Includes 2x M4 stainless steel hex head screws and flat washers</li> </ul> <p><b>Hole center spacing:</b> A = 40, B = 20</p> <p><b>Hole size:</b> A = <math>\varnothing 5</math></p>	
<p><b>SMBR95RA</b></p> <ul style="list-style-type: none"> <li>Stainless steel right-angle bracket</li> <li>M4 x 0.7 mm #316SS screws (qty 2)</li> </ul>	

## 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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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).