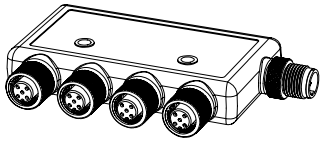
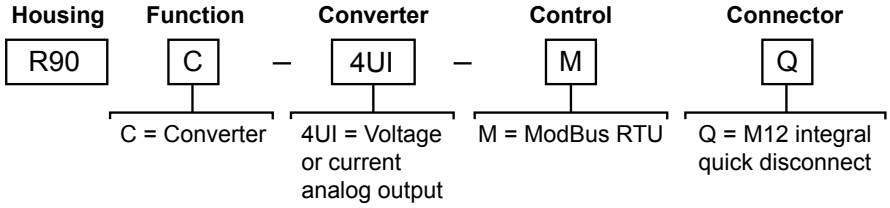
R90C 4-Port Modbus® to Analog Hub

Instruction Manual



- Compact ModBus® to analog converter that generates a current or voltage output on each of the four ports
- Rugged over-molded design meets IP65, IP67, and IP68
- Connects directly to a sensor or anywhere in-line for ease of use
- R90C ModBus hubs are a quick, easy, and economical way to integrate analog outputs into a ModBus system

Models



Overview

The R90C 4-Port ModBus to Analog Hub can output either 0 V to 10 V, or 4 mA to 20mA, to each of the four unique ports. Writing to the appropriate ModBus RTU register allows the user to select the type of output - voltage or current - for each port.

ModBus Configuration

Table 1: Analog Out Value

ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40001	Port 1 - Analog Value	0..20200	Max Voltage = 10200 mV Max Current = 20200 µA If value > Max, value = Max	0	RW	Same as 41201
40002	Port 2 - Analog Value	0..20200	Max Voltage = 10200 mV Max Current = 20200 µA If value > Max, value = Max	0	RW	Same as 42201
40003	Port 3 - Analog Value	0..20200	Max Voltage = 10200 mV Max Current = 20200 µA If value > Max, value = Max	0	RW	Same as 43201
40004	Port 4 - Analog Value	0..20200	Max Voltage = 10200 mV Max Current = 20200 µA If value > Max, value = Max	0	RW	Same as 44201

Table 2: Multi-Port Support

ModBus Register Addresses	Description
41200-41399	Port 1
42200-42399	Port 2
43200-43399	Port 3
44200-44399	Port 4

Table 3: Analog Out

ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
41200	Analog Out	0..2	0 = Off 1 = Voltage 2 = Current	1	RW	—
41201	Analog Value	0..20200	Max Voltage = 10200 mV Max Current = 20200 uA If value > Max, value = Max	0	RW	—
41202	Analog Change Value	1..1000	Number of DAC bits for each incremental/decremental step Voltage bit = mV Current bit = µA	100	RW	—
41203	Increment Analog Out	0..1	0 = Idle, 1 = DAC Incremental Step	—	Write Once	Write 1 = Increment, back to 0
41204	Decrement Analog Out	0..1	0 = Idle, 1 = DAC Decremental Step	—	Write Once	Write 1 = Decrement, back to 0
41205	Actual DAC Value	0..4095	12-bit DAC value	—	RO	—

Table 4: Analog Out LED

ModBus Register Address	Description	I/O Range	Comments	Default	Access
41300	Output LED Set Point Hysteresis	0..500	Voltage = mV, Current = uA	100	RW
41301	Minimum Set Point Value for Analog Out LED	0..20200	Must be less than maximum Min Voltage = 0 mV Min Current = 3500 µA If value < Min, value = Min	Voltage = 100 mV Current = 4000 uA	RW
41302	Maximum Set Point Value for Analog Out LED	1..20200	Must be greater than minimum Min Voltage = 10200 mV Min Current = 20200 µA If value > Max, value = Max	Voltage = 10000 mV Current = 20000 uA	RW

Table 5: 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	1-247	1 to 247	1	RW
40604	Reserved (cannot be read or written)	None	—	—	RW
40605	Restore Factory Configuration	0 = No Operation 1 = Restore	—	—	WO

Table 6: Device Information

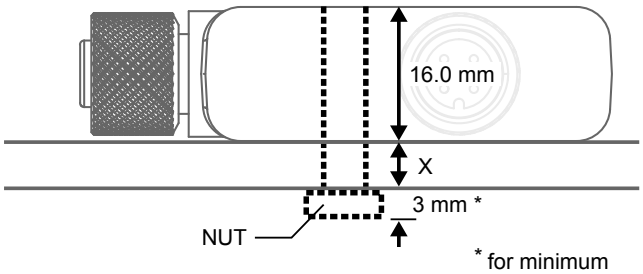
ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40606-40615	Banner Name	0..65535	—	Banner Engineering	RO	(9 words/18 Characters)
40616-40631	Product Name	0..65535	—	R90C-4UI-MQ	RO	(16 words/32 Characters)
40632	Item H	0..65535	813596 split into two 16-bit registers	12	RO	Banner Item Number

ModBus Register Address	Description	I/O Range	Comments	Default	Access	Notes
40633	Item L	0..65535	—	27164	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)

Mechanical Installation

Install the R90C 4-Port ModBus to Analog Hub to allow access for functional checks, maintenance, and service or replacement.

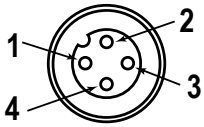
All mounting hardware is supplied by the user. Fasteners must be of sufficient strength to guard against breakage. Use of permanent fasteners or locking hardware is recommended to prevent the loosening or displacement of the device. The mounting hole (4.5 mm) in the R90C 4-Port ModBus to Analog Hub accepts M4 (#8) hardware. See the figure below to help in determining the minimum screw length.

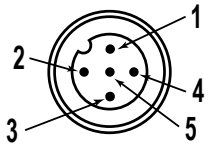


Screw Length = 16.0 mm + “X” mm + 3 mm

CAUTION: Do not overtighten the R90C 4-Port ModBus to Analog Hub's mounting screw during installation. Overtightening can affect the performance of the R90C 4-Port ModBus to Analog Hub.

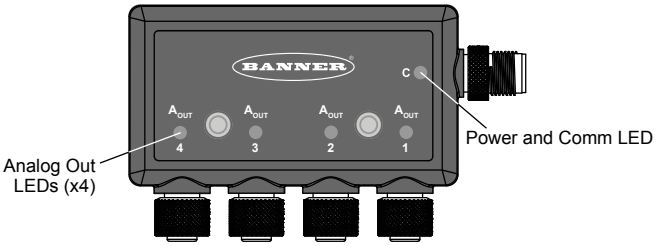
Wiring

Port 1, 2, 3, and 4 – Female	Pin	Signal Description
	1	24 V DC
	2	N/C
	3	Ground
	4	Analog Out

Comm Port – Male	Pin	Signal Description
	1	24 V DC
	2	RS485/D1/B/+
	3	Ground
	4	RS485/D0/A-
	5	Banner 1-wire

Status Indicators

The R90C 4-Port ModBus to Analog Hub has matching amber LED indicators on both sides for each analog output port to allow for installation needs and still provide adequate indication visibility.



Analog Output Amber LEDs	
Indication	**Status**
Off	Turns off if the actual analog out value is outside the defined output range
Solid Amber	Turns on if the actual analog out value is within the defined output range

Power and Communication Green LED	
Indication	**Status**
Off	Power off
Solid Green	Power on
Flashing Green, 4 Hz	ModBus Communications are active

Specifications

Supply Voltage
24 V DC (± 10%) at 125 mA maximum

Power Pass-Through Current
4 A maximum total across all four ports

Load Requirements
Voltage Mode = Resistance > 1000 ohms
Current Mode = Resistance < 500 ohms

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Leakage Current Immunity
400 µA

Indicators
Green: Power, ModBus communication
Amber: Analog output status

Connections
(4) 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

Environmental Rating
IP65, IP67, IP68
NEMA/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

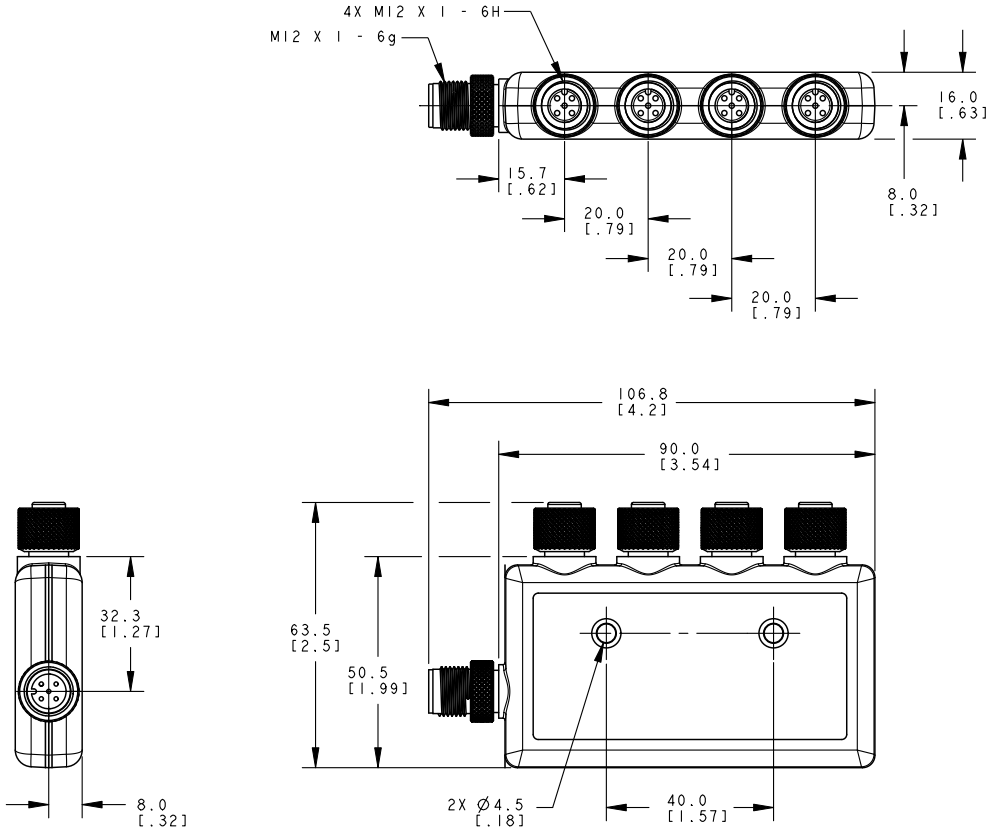
WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

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 (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

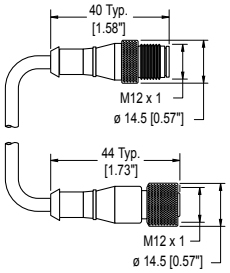
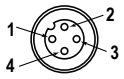
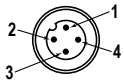
Dimensions

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  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-403SS	0.91 m (2.99 ft)			
MQDEC-406SS	1.83 m (6 ft)			
MQDEC-412SS	3.66 m (12 ft)			
MQDEC-420SS	6.10 m (20 ft)			
MQDEC-430SS	9.14 m (30.2 ft)			
MQDEC-450SS	15.2 m (49.9 ft)			

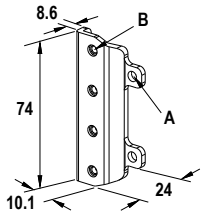
Brackets

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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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

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.