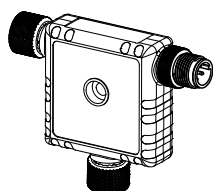


R45C Discrete to Serial Converter



Datasheet



- Compact configurable discrete I/O to PICK-IQ converter
- Rugged over-molded design meets IP65, IP67, and IP68
- Connects directly to a sensor or anywhere in-line for ease of use

Overview

The R45C-B22-SQ is an easy-to-use converter that allows addition of a discrete I/O device to a PICK-IQ network. This converter can be placed anywhere in the PICK-IQ network. Both I/O points on the discrete connection can be configured as inputs or outputs.

Communications

These devices are powered by PICK-IQ®, a purpose-built, Modbus RTU compatible serial bus protocol that uses a Common ID to reduce the typical latency that results from polling multiple devices.

The standard Modbus protocol structure does not offer the performance required to operate medium to large sized pick-to-light systems with low latency response times. Adding more devices to a pick-to-light system running standard Modbus protocol eventually makes a pick-to-light system unusable because of the request/response nature of the protocol. The communication latency to and from the master device is too slow.

Using PICK-IQ adds a simple change to the devices that allow the Modbus master controller to run standard Modbus protocol, but achieve the performance required by a medium to large sized pick-to-light system. This change is the addition of a common ID addressing scheme.

PICK-IQ Configuration

For more information on the PICK-IQ network functionality, see Banner P/N 206185 [PICK-IQ Devices Instruction Manual](#).

Table 1: Holding Registers

Modbus Register Address	Description	Holding Register Registration	Comments
I/O Register Block			
3000	Input 1 Status	0 = Inactive 1 = Active	Returns the status of an input on Channel 1
3001	Input 2 Status	0 = Inactive 1 = Active	Returns the status of an input on Channel 2
3002	Output 1 Enable	0 = Disabled 1 = Enabled	Activates the output on Channel 1 ¹
3003	Output 2 Enable	0 = Disabled 1 = Enabled	Activates the output on Channel 2 ¹
Input Settings Register Block			
3430	Input 1 Enable	0 = Disabled 1 = Enabled	Monitors Channel 1 or input signals
3431	Input 1 Polarity	0 = NPN 1 = PNP	Defines the input signal type on Channel 1
3432	Input 2 Enable	0 = Disabled 1 = Enabled	Monitors Channel 2 or input signals
3433	Input 2 Polarity	0 = NPN 1 = PNP	Defines the input signal type on Channel 2
Output Settings Register Block			
3440	Output 1 Push/Pull Enable	0 = Disabled 1 = Enabled	Enables a push/pull circuit, stabilizing Output 1 ²
3441	Output 1 Polarity	0 = NPN 1 = PNP	Defines the output signal type on Channel 1
3442	Output 2 Push/Pull Enable	0 = Disabled 1 = Enabled	Enables a push/pull circuit, stabilizing Output 2 ²
3443	Output 2 Polarity	0 = NPN 1 = PNP	Defines the output signal type on Channel 2



Note: Alternative Modbus interface is not available for this device.

¹ When enabling an output, it is important to disable the input on the corresponding channel. This prevents the output from triggering the common ID.

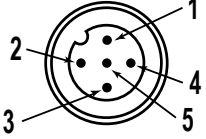
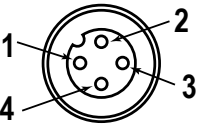
² Push/pull should only be enabled when using the output on the corresponding channel. Otherwise, if used while an input is enabled and in use, it is possible to lock the value of the input signal.



Table 2: Holding Registers When Common ID is Active

Modbus Register Address	Description	Holding Register Registration	Comments
7940	Modbus Device ID of Active Device	—	—
7941	Device Output Latch Register	0 = None triggered 1 = Primary triggered 2 = Secondary triggered 3 = Both triggered	Values in this register latch until acknowledged and cleared by the master
7942	Device Output Status	0 = None triggered 1 = Primary triggered 2 = Secondary triggered 3 = Both triggered	Values in this register reflect the real time status of the device's outputs

Wiring Diagrams

Male	Female	Pin	Wire Color
		1	Brown
		2	White
		3	Blue
		4	Black
		5	Gray

Female (Serial In)	Male (Serial Out)	Signal Description	Female (Discrete Input)	Signal Description
Pin 1		12 V DC to 30 V DC	Pin 1	12 V DC to 30 V DC
Pin 2		RS-485 (+)	Pin 2	IO Channel 2
Pin 3		DC common	Pin 3	Ground
Pin 4		RS-485 (-)	Pin 4	IO Channel 1
Pin 5		Shield	Pin 5	Shield

Status Indicators

Power LED Indicator (Green)

- Solid Green = Power On
- Off = Power Off

PICK-IQ Communication LED Indicator (Amber)

- Flashing Amber = PICK-IQ communications are active
- Off = PICK-IQ communications are not present

Specifications

Supply Voltage

12 V DC to 30 V DC at 50 mA maximum

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Leakage Current Immunity

400 μ A

Operating Conditions

Temperature: -40 °C to +50 °C (-40 °F to +122 °F)

90% at +70 °C maximum relative humidity (non-condensing)

Storage Temperature: -40 °C to +80 °C (-40 °F to +176 °F)

Output Protection Circuitry

Protected against output short-circuit

IndicatorsGreen power
Amber PICK-IQ communications**Connections**

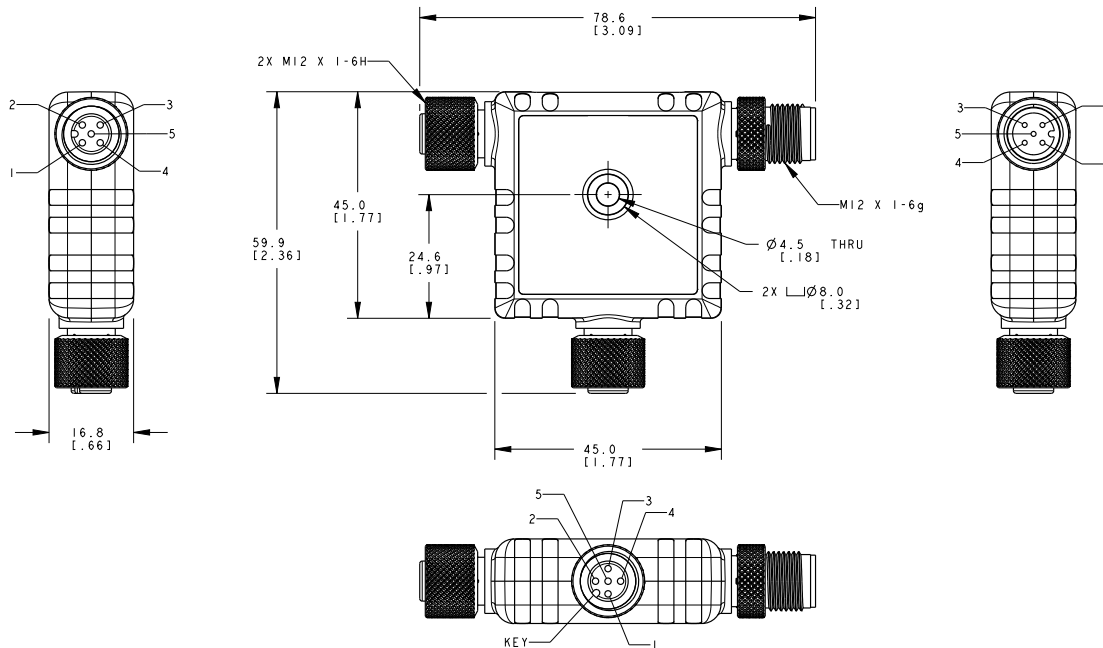
Integral male/female 5-pin M12 quick disconnect

ConstructionCoupling 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
NEMA/UL Type 1**Certifications****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**

5-Pin Threaded M12 Cordsets—Double Ended					
Model	Length	Style	Dimensions	Pinout (Male)	Pinout (Female)
MQDEC-501SS	0.31 m (1.02 ft)	Male Straight/ Female Straight			
MQDEC-503SS	0.91 m (2.99 ft)			1 = Brown 2 = White 3 = Blue	4 = Black 5 = Gray
MQDEC-506SS	1.83 m (6 ft)				
MQDEC-512SS	3.66 m (12 ft)				

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.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.

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For patent information, see www.bannerengineering.com/patents.

FCC Part 15 and CAN ICES-3 (B)/NMB-3(B)

This device complies with part 15 of the FCC Rules and 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.

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 and CAN ICES-3 (B)/NMB-3(B). 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 manufacturer.

S15C Thermistor Temperature Probe to Modbus® Converter

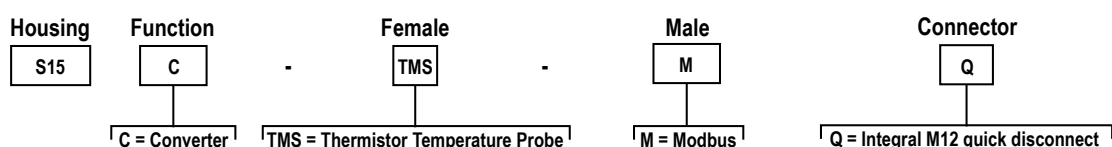


Datasheet



- Compact converter that connects to a thermistor probe and outputs the value to Modbus® registers
- Rugged over-molded design meets IP65, IP67, and IP68
- Connects directly to a sensor or anywhere in-line for ease of use

Models



Modbus Configuration

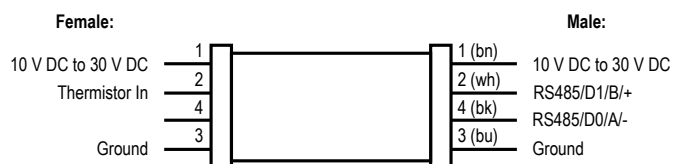
Modbus Register Address	Type	Name	I/O Range	Description	Notes	Default
IO Data Out						
40001	int16, Read Only	IO Data	Temperature °C (°F) = -4000 to +10500 (-4000 to +22100) Thermistor Resistance = 70 to 23980	Analog Data output ¹	Temperature °C/°F = Data Output ÷ 100 Thermistor Resistance = Data Output × 10	-
40002	int16, Read Only	IO Alarm State	-	-	0 = Within threshold range 1 = Out of threshold range	-
40003	int16, Read Only	IO Error Status	STATUS_ERROR_TYPE_NO_ERROR = 0 STATUS_ERROR_TYPE_BELOW_MIN = 1 STATUS_ERROR_TYPE_ABOVE_MAX = 2 STATUS_ERROR_TYPE_INVALID_THERM_OUTPUT = 3 STATUS_ERROR_TYPE_INVALID_THERM_TYPE = 4	Status of program	0-4 value	-
IO Data Rate						
41001	int16, Read and Shadow write	Sample IO	-	Sample interval time for IO	Minimum rate: 62.5 ms (0x01)	0x10 (1 sec)
Thermistor Input 1						
41014	uint16, Read and Shadow write	Thermistor curve Type	THERM_TYPE_G_CURVE = 0 THERM_TYPE_J_CURVE = 1	Selects which Thermistor type is utilized.	0 - 1 value, Thermistor Only	0
41015	uint16, Read and Shadow write	Output Type	THERM_OUTPUT_TYPE_C = 0 THERM_OUTPUT_TYPE_F = 1 THERM_OUTPUT_TYPE_RES = 2	Select which data value (Celsius, Fahrenheit, or Resistance) to output to IO 1 data (40001)	0 - 2 value	0
COMs Settings						

¹ IO Data readings below the minimum or above the maximum readings (see I/O range at register address 40001) rails to -32768 or 32767, respectfully.



Modbus Register Address	Type	Name	I/O Range	Description	Notes	Default
46101	Baud Rate	-	0 = 9.6k 1 = 19.2k 2 = 38.4k	-	-	1
46102	Parity	-	0 = None 1 = Odd 2 = Even	-	-	None
46103	Modbus Slave Address	-	1 to 247	-	-	1

Wiring Diagrams



Male (Gateway)	Female (Sensor)	Pin	Wire Color
		1	Brown
		2	White
		3	Blue
		4	Black



Important: If using a cable to connect the converter to an analog sensor, use of a shielded M12 cable is recommended, with the shield tied to pin 3.

Status Indicators

Power LED Indicator (Green)

- Solid Green = Power On
- Off = Power Off

Modbus Communication LED Indicator (Amber)

- Flashing Amber (4 Hz) = Modbus communications are active
- Solid Amber for 2 seconds to Off = Modbus communications are lost after connection
- Solid Amber for 2 seconds to Flashing Amber (4 Hz) = Modbus communications momentarily lost, but communication reestablished
- Solid Amber = Modbus communications are intermittent, or communications error occurs more frequently than once every 2 seconds
- Off = Modbus communications are not present

Specifications

Supply Voltage

10 V DC to 30 V DC at 50 mA maximum

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Leakage Current Immunity

400 µA

Resolution

12-bits

Accuracy

± 1.5 °C (± 3 °F)

Indicators

Green power
Amber Modbus communications

Connections

Integral male/female 4-pin M12 quick disconnect

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



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



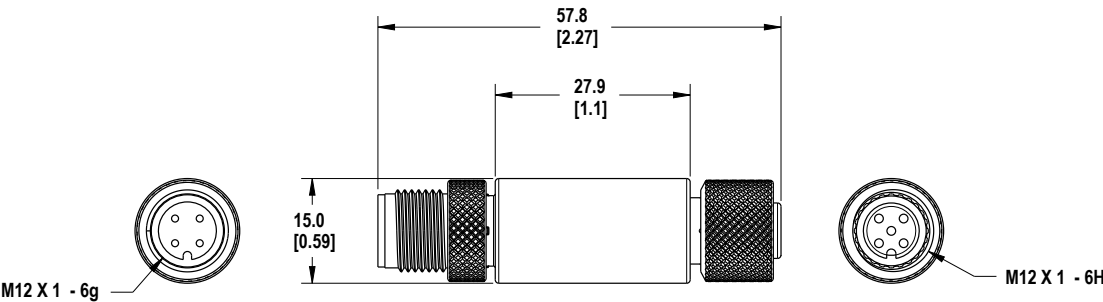
WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

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

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For patent information, see www.bannerengineering.com/patents.

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- 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 manufacturer.



more sensors, more solutions

S15C Analog Voltage to Modbus Converter



Datasheet



- Compact analog voltage to Modbus converter that connects to a voltage source (0 V to 10 V) and outputs the value to Modbus registers
- Rugged over-molded design meets IP65, IP67, and IP68
- Connects directly to a sensor or anywhere in-line for ease of use

Models



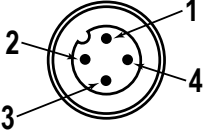
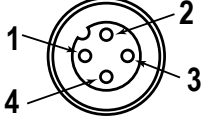
Modbus Configuration

Modbus Register Address	Description	I/O Range	Comments	Default	Access
IO Data Out					
40001	Analog Data output	0..10000	Voltage (V) = Register Value / 1000	0-10	RO
40002	Alarm State for IO 1 based on Min and Max thresholds defined in Analog In Min Value () and Analog In Max Value()	0..1	0 = Within threshold range 1 = Out of threshold range	-	RO
40003	Status of program	0..2	STATUS_ERROR_TYPE_NO_ERROR = 0 STATUS_ERROR_TYPE_BELOW_MIN = 1 STATUS_ERROR_TYPE_ABOVE_MAX = 2	-	RO
Input_ADC_Config					
41001	Sample interval time	0.65535	0 = Disabled 1 = 10 ms 2..65535 = 5 ms increments	1	RW
FilterConfig					
41002	Takes current ADC value and the last 2 ADC readings and takes the median of the 3 values.	0..1	0 = Median Filter Disabled 1 = Median Filter Enabled	0	RW
Minimum Value					
41004	Minimum analog value for data read	0..9	Must be less than maximum	0	RW
Maximum Value					
41005	Max analog value for data read	1..10	Must be greater than the minimum	10	RW
COMs Settings					
46101	Baud Rate	0 = 9.6k 1 = 19.2k 2 = 38.4k	0 = 9.6k 1 = 19.2k 2 = 38.4k	1	RW
46102	Parity	0 = None 1 = Odd 2 = Even	0 = None 1 = Odd 2 = Even	0	RW
46103	Slave Address	1..247	1 to 247	1	RW



Wiring Diagrams

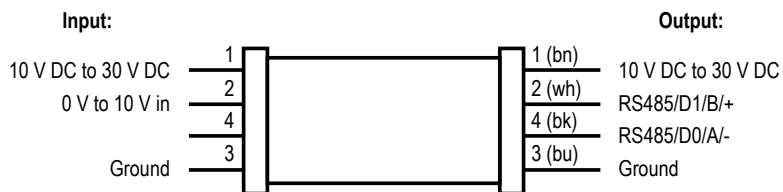


Male (Gateway)	Female (Sensor)	Pin	Wire Color
		1	Brown
		2	White
		3	Blue
		4	Black



Important: If using a cable to connect the converter to an analog sensor, use of a shielded M12 cable is recommended, with the shield tied to pin 3.

Connecting 0 V to 10 V Analog Sensors



Status Indicators

Power LED Indicator (Green)

- Solid Green = Power On
- Off = Power Off

Modbus Communication LED Indicator (Amber)

- Flashing Amber (4 Hz) = Modbus communications are active
- Solid Amber for 2 seconds to Off = Modbus communications are lost after connection
- Solid Amber for 2 seconds to Flashing Amber (4 Hz) = Modbus communications momentarily lost, but communication reestablished
- Solid Amber = Modbus communications are intermittent, or communications error occurs more frequently than once every 2 seconds
- Off = Modbus communications are not present

Specifications

Supply Voltage

10 V DC to 30 V DC at 50 mA maximum

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Leakage Current Immunity

400 μ A

Resolution

12-bits

Accuracy

1.5% of full scale

Indicators

Green power
Amber Modbus communications

Connections

Integral male/female 4-pin M12 quick disconnect

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



Environmental Rating

IEC IP65, IEC IP67, IEC 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.

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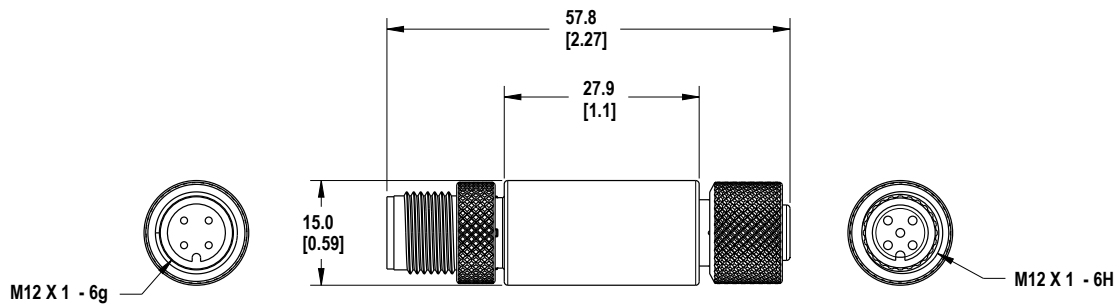
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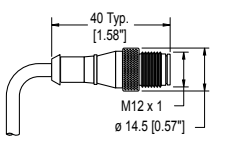
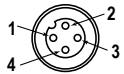
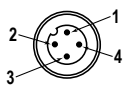
Dimensions

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

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- 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 manufacturer.



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S15C Analog Current to Modbus Converter



Datasheet



- Compact analog current to Modbus converter that connects to a current source (4 mA to 20 mA) and outputs the value to Modbus registers
- Rugged over-molded design meets IP65, IP67, and IP68
- Connects directly to a sensor or anywhere in-line for ease of use

Model



Modbus Configuration

Modbus Register Address	Description	I/O Range	Comments	Default	Access
IO Data Out					
40001	Analog Data output	0-32768	Current (mA) = Register Value / 1000	4000-20000	RO
40002	Alarm State for IO 1 based on Min and Max thresholds defined in Analog In Min Value () and Analog In Max Value()	0..1	0 = Within threshold range 1 = Out of threshold range	-	RO
40003	Status of program	0..2	STATUS_ERROR_TYPE_NO_ERROR = 0 STATUS_ERROR_TYPE_BELOW_MIN = 1 STATUS_ERROR_TYPE_ABOVE_MAX = 2	-	RO
Input_ADC_Config					
41001	Sample interval time	0..65535	0 = Disabled 1 = 10 ms 2..65535 = 5 ms increments	1	RW
FilterConfig					
41002	Takes current ADC value and the last ADC reading and takes the median of the values.	0..1	0 = Median Filter Disabled 1 = Median Filter Enabled	0	RW
Minimum Value					
41004	Minimum analog value for data read	0..31 mA	Must be less than maximum	4 mA	RW
Maximum Value					
41005	Max analog value for data read	1..32 mA	Must be greater than the minimum	20 mA	RW
COMs Settings					
46101	Baud Rate	0 = 9.6k 1 = 19.2k 2 = 38.4k	0 = 9.6k 1 = 19.2k 2 = 38.4k	1	RW
46102	Parity	0 = None 1 = Odd 2 = Even	0 = None 1 = Odd 2 = Even	0	RW
46103	Slave Address	1..247	1 to 247	1	RW



Wiring Diagrams

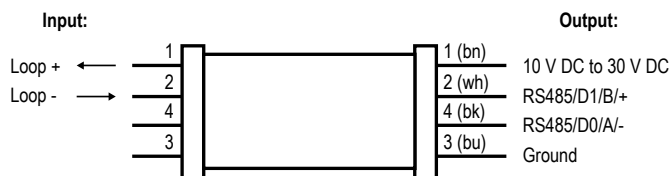


Male (Gateway)	Female (Sensor)	Pin	Wire Color
		1	Brown
		2	White
		3	Blue
		4	Black

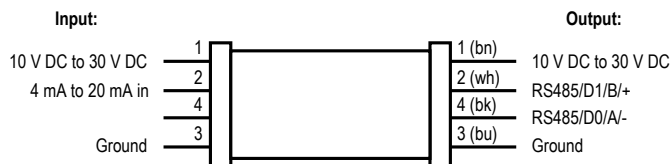


Important: If using a cable to connect the converter to an analog sensor, use of a shielded M12 cable is recommended, with the shield tied to pin 3.

Connecting 2-wire 4 mA to 20 mA Sensors



Connecting 3-wire 4 mA to 20 mA Sensors



Status Indicators

Power LED Indicator (Green)

- Solid Green = Power On
- Off = Power Off

Modbus Communication LED Indicator (Amber)

- Flashing Amber (4 Hz) = Modbus communications are active
- Solid Amber for 2 seconds to Off = Modbus communications are lost after connection
- Solid Amber for 2 seconds to Flashing Amber (4 Hz) = Modbus communications momentarily lost, but communication reestablished
- Solid Amber = Modbus communications are intermittent, or communications error occurs more frequently than once every 2 seconds
- Off = Modbus communications are not present

Specifications

Supply Voltage

10 V DC to 30 V DC at 50 mA maximum

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Leakage Current Immunity

400 μ A

Resolution

12-bits

Accuracy

1.5% of full scale

Indicators

Green power
Amber Modbus communications

Connections

Integral male/female 4-pin M12 quick disconnect

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



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.

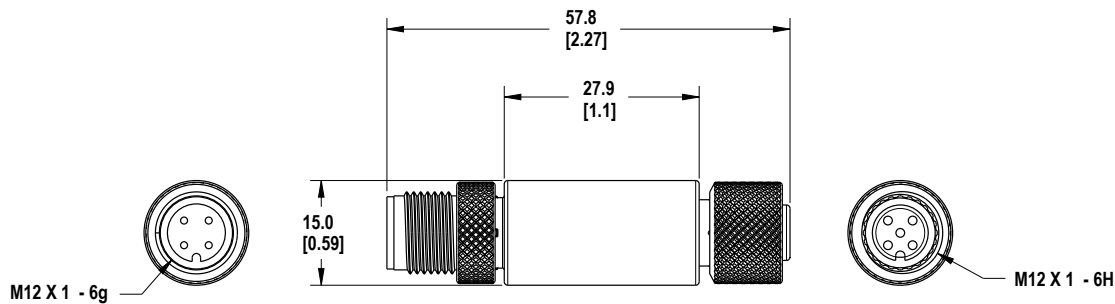
Supply wiring leads < 24 AWG shall not be spliced.

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

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.

FCC Part 15 and CAN ICES-3 (B)/NMB-3(B)

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- 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 manufacturer.



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S15C Current Transformer to Modbus® Converter **BANNER®**

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Datasheet



- Compact current transformer to Modbus® converter that connects to 20 A or 150 A current transformers and outputs the value to modbus registers
- Monitor AC current for various devices using current transformers
- Current transformer input takes a high voltage input and produces a proportional low-voltage, low-current signal for measuring and monitoring
- Rugged over-molded design meets IP65, IP67, and IP68

Models



For use with the following current transformer models:

Model Kits	Description	Connection
BWA-CURRENT-TRANSFORMER-20A	Includes CT20A; 20 A Input; 0.333 V Output	1 meter two-wire twisted pair cable
BWA-CURRENT-TRANSFORMER-150A	Includes CT150A; 150 A Input; 0.333 V Output	

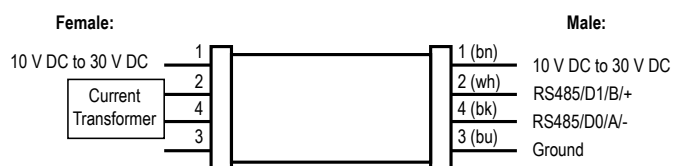
Modbus Configuration

Modbus Register Address	Type	Name	I/O Range	Description	Notes	Default
IO Data Out						
40001	int16, Read Only	IO Data	0-32768	Analog Data output	AC RMS Current (A) = Register Value/100	0-2000
40002	bool, Read Only	IO Alarm State	-	Alarm State for IO based on Min and Max thresholds defined in Analog In Min Value () and Analog In Max Value()	0 = Within threshold range 1 = Out of threshold range	-
40003	int16, Read Only	IO Error Status	STATUS_ERROR_TYPE_NO_ERROR = 0 STATUS_ERROR_TYPE_BELOW_MIN = 1 STATUS_ERROR_TYPE_ABOVE_MAX = 2	Status of program	0-2 value	-
IO Data Rate						
41001	int16, Read and Shadow write	Sample IO	-	Sample interval time for IO	Minimum rate: 62.5 ms (0x01)	0x10 (1 sec)
Minimum Value						
41004	uint16, Read and Shadow write	Minimum Analog Value	-	Minimum analog value for data read	Minimum value: 0	0
Maximum Value						
41005	uint16, Read and Shadow write	Maximum Analog Value	-	Max analog value for data read	Maximum value: 20	20
CT Type Input						



Modbus Register Address	Type	Name	I/O Range	Description	Notes	Default
41014	uint16, Read and Shadow write	CT mV value	-	Millivolt value of the transformer used	-	333 mV
41015	uint16, Read and Shadow write	CT Amp value	-	Amp value of the transformer used	-	20 A
COMs Settings						
46101	Baud Rate	-	0 = 9.6k 1 = 19.2k 2 = 38.4k	-	-	1
46102	Parity	-	0 = None 1 = Odd 2 = Even	-	-	None
46103	Modbus Slave Address	-	1 to 247	-	-	1

Wiring Diagrams



Male (Gateway)	Female (Sensor)	Pin	Wire Color
		1	Brown
		2	White
		3	Blue
		4	Black

Female (Sensor)	Signal Description
Pin 1	10 V DC to 30 V DC
Pin 2	CT Input
Pin 3	Not Used
Pin 4	CT Ground



Important: If using a cable to connect the converter to an analog sensor, use of a shielded M12 cable is recommended, with the shield tied to pin 3.

Male (Gateway)	Signal Description
Pin 1	10 V DC to 30 V DC
Pin 2	RS485/D1/B/+
Pin 3	Ground
Pin 4	RS485/D0/A/-

Status Indicators

Power LED Indicator (Green)

- Solid Green = Power On
- Off = Power Off

Modbus Communication LED Indicator (Amber)

- Flashing Amber (4 Hz) = Modbus communications are active
- Solid Amber for 2 seconds to Off = Modbus communications are lost after connection
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- Solid Amber = Modbus communications are intermittent, or communications error occurs more frequently than once every 2 seconds
- Off = Modbus communications are not present

Specifications

Supply Voltage

18 V DC to 30 V DC at 50 mA maximum

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Leakage Current Immunity

400 μ A

Resolution

12-bits

CT20A and CT150A Current Transformer

Electrical:

Rated Input: 0 A - 20 A (CT20A) or 0 A - 150 A (CT150A)

Rated Output: 0.333 V AC

Ratio: $\leq \pm 1.0\%$

Phase Angle: $\leq \pm 60$ min

Dielectric Strength: 2.5 kV/1 mA/1 min

Insulation Resistance: DC 500 V/100 M Ω min

Mechanical:

Case: PA / UL94-V0

Bobbin: PBT

Core: Silicon Steel

-25 °C to +75 °C (-13 °F to +167 °F)

$\leq 85\%$ maximum relative humidity (non-condensing)

For more information, refer to the Split Core Current Transformer datasheet (p/n 212463)

Indicators

Green power

Amber Modbus communications

Connections

Integral male/female 4-pin M12 quick disconnect

Construction

Coupling Material: Nickel-plated brass

Connector Body: PVC translucent black

Certifications



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

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)

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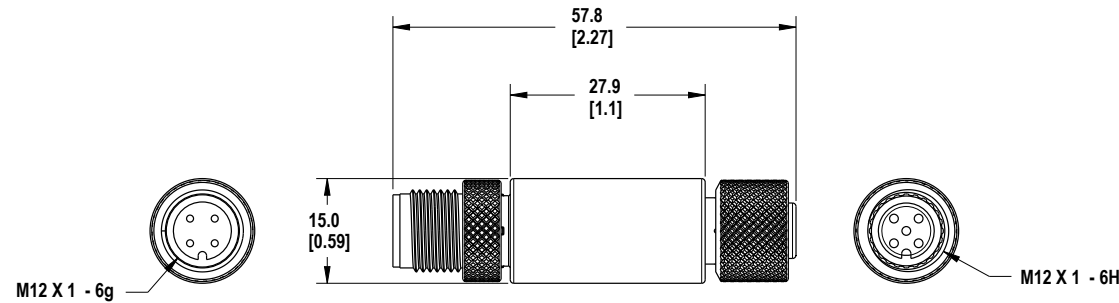
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30	0.5

Dimensions

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Accessories

Cordsets

4-Pin Threaded M12 Cordsets—Double Ended				
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