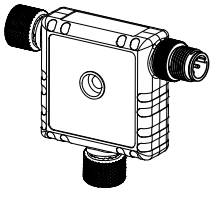
R45C Discrete to Serial Converter

more sensors, more solutions

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.

Original Document
222571 Rev. A

20 August 2021

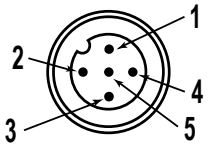
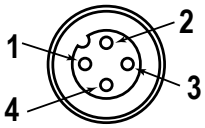
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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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
Pin 1		12 V DC to 30 V DC
Pin 2		RS-485 (+)
Pin 3		DC common
Pin 4		RS-485 (–)
Pin 5		Shield

Female (Discrete Input)	Signal Description
Pin 1	12 V DC to 30 V DC
Pin 2	IO Channel 2
Pin 3	Ground
Pin 4	IO Channel 1
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 µA

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

Indicators
Green power
Amber PICK-IQ communications

Connections
Integral male/female 5-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)

Environmental Rating
IP65, IP67, IP68
NEMA/UL Type 1

Certifications

Required Overcurrent Protection

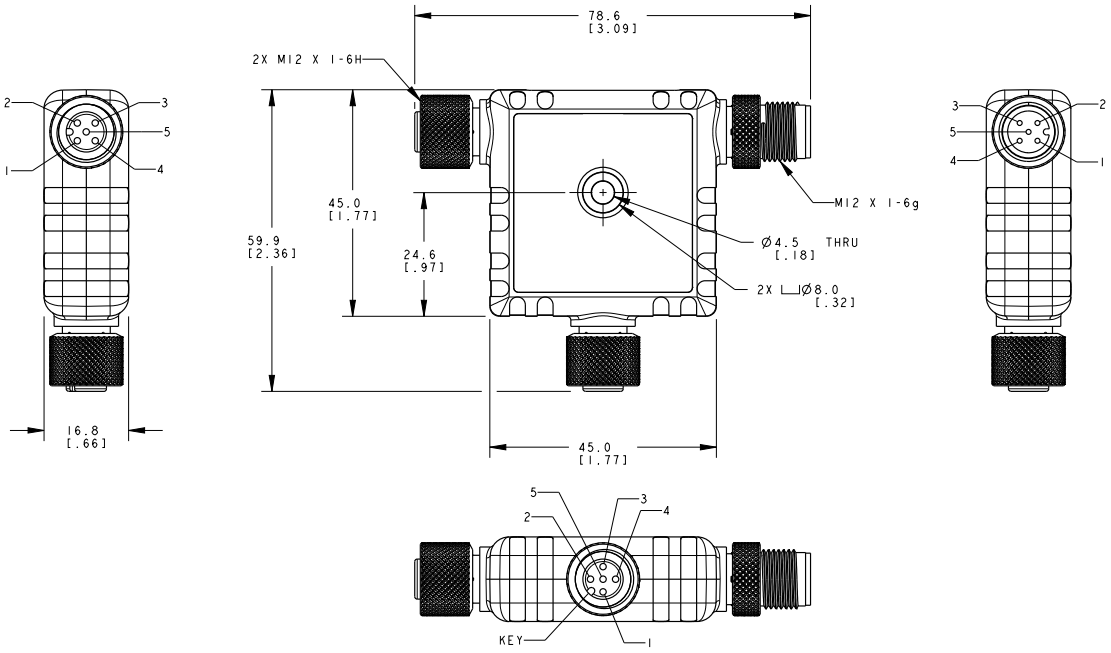
WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

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

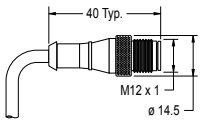
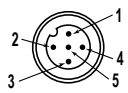
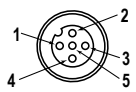
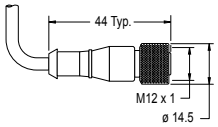
Dimensions

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)				
MQDEC-506SS	1.83 m (6 ft)			1 = Brown 2 = White 3 = Blue	4 = Black 5 = Gray
MQDEC-512SS	3.66 m (12 ft)				

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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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This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

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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.

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