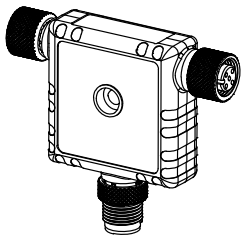
R45C-2K-MQ IO-Link Master/Modbus Converter

more sensors, more solutions

Datasheet



- Connects two IO-Link devices and provides access via Modbus RTU interface
- Rugged design; easy installation with no assembly or individual wiring required
- 5-pin M12 male quick disconnect connector
- Two 4-pin M12 female quick disconnect connectors
- Built-in indication for two IO-Link master ports
- Built-in indication for Modbus RTU connection status
- Rugged over-molded design meets IP65, IP67, and IP68

Models

Housing	Function		Converter		Connection	Connector
R45	C	–	2K	–	M	Q
	C = Converter		2K = 2-port IO-Link Master (female)		M = Modbus Slave Connection (male)	Q = M12 Integral QD

Overview

The R45C 2-Port Converter connects to two IO-Link devices and provides access to IO-Link data and functionality via a Modbus RTU connection.

Modbus registers allow for access to both IO-Link devices and their functions:

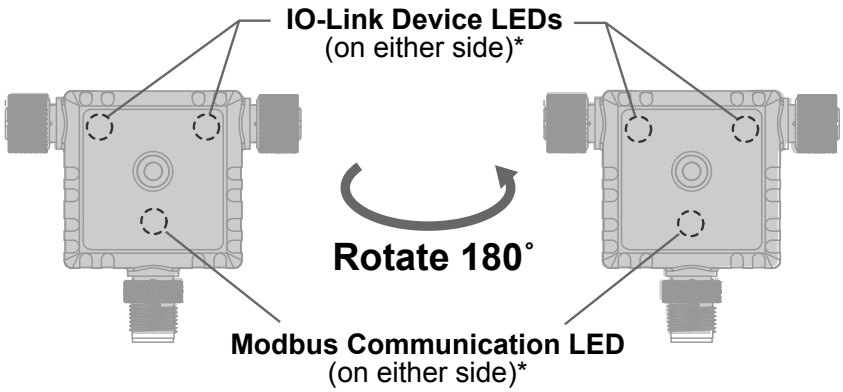
- Process Data In
- Process Data Out
- Connected device information
- ISDU data
- Discrete I/O configuration
- IO-Link events
- Data storage
- SIO mode

For more information, see p/n 221399 *IO-Link to ModBus Converter - Device Register Map*.

Status Indicators

The R45C-2K-MQ IO-Link Master/Modbus Converter has matching RGB LED indicators on both sides for each IO-Link device port to allow for installation needs and still provide adequate indication visibility. There is also an Amber LED indicator on both sides of the converter, which is specific to the Modbus communication.

Figure 1. R45C 2-Port Converter status indicators – front and back



* Indicator LEDs are visible through translucent housing

IO-Link Device Port 1 and Port 2 RGB LEDs	
Indication	**Status**
Off	Deactivated port
Flashing Green	Waiting for IO-Link device
Solid Green	IO-Link device is connected
Flashing Red	Validation Error
Solid Yellow	Signal high in SIO-mode
Solid Blue	Processor communication error

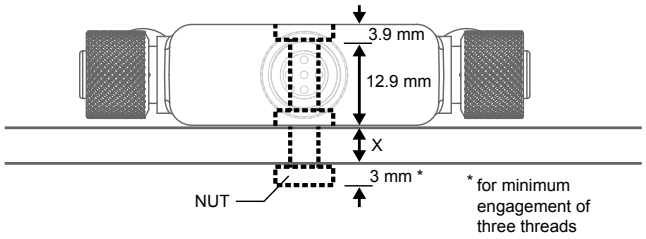
Modbus Communication Amber LED	
Indication	**Status**
Flashing Amber (4 Hz)	Modbus communications are active
Solid Amber (2 seconds) to Off	Modbus communications are lost after connection
Solid Amber (2 seconds) to Flashing Amber (4 Hz)	Modbus communications momentarily lost, but then reestablished
Solid Amber	Modbus communications are intermittent, or communications error occurs more frequently once every 2 seconds
Off	Modbus communications are not present

Installation Instructions

Mechanical Installation

Install the R45C 2-Port Converter to allow access for functional checks, maintenance, and service or replacement.

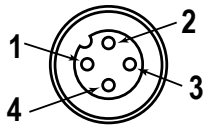
All mounting hardware is supplied by the user. Fasteners must be of sufficient strength to guard against breakage. Use of permanent fasteners or locking hardware is recommended to prevent the loosening or displacement of the device. The mounting hole (4.5 mm) in the R45C 2-Port Converter accepts M4 (#8) hardware. See the figure below to help in determining the minimum screw length.

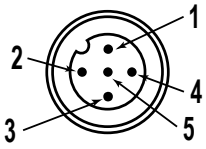


Screw Length (with screw head fitting in counterbore) = 12.9 mm + “X” mm + 3 mm

CAUTION: Do not overtighten the R45C 2-Port Converter's mounting screw during installation. Overtightening can affect the performance of the R45C 2-Port Converter.

Wiring

Port 1 and Port 2 – Female	Pin	Signal Description
	1	18 V DC to 30 V DC
	2	I/Q (digital in-out)
	3	Ground
	4	C/Q (communications/digital in-out)

Comm Port – Male	Pin	Signal Description
	1	18 V DC to 30 V DC
	2	RS485/D1/B/+
	3	Ground
	4	RS485/D0/A-
	5	Banner 1-wire

Specifications

Voltage Input Range
18 V DC to 30 V DC

Input Power
24 V DC at 4A

Output Power
24 V DC at 50 mA + 200 mA/port = 450 mA maximum

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Leakage Current Immunity
400 µA

Indicators
RGB1: IO-Link Port 1 Status
RGB2: IO-Link Port 2 Status
Amber: Modbus Communications

Connections
(2) Integral 4-pin M12 female quick disconnect
(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, 1.0 mm amplitude, 5 minutes sweep, 30 minutes dwell)
Meets IEC 60068-2-27 requirements (Shock: 30G 11 ms duration, half sine wave)

Environmental Ratings
For Indoor Use Only
IP65, IP67, IP68, UL Type 1

Operating Conditions
–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)

IO-Link Baud Rates
COM1: 4.8 kbps
COM2: 38.4 kbps
COM3: 230.4 kbps

Compliant Standards
IO-Link interface and System Specification v 1.1.2
IO-Link Test Specification v 1.1.2

Master Communication Protocol
RS485 – Modbus RTU

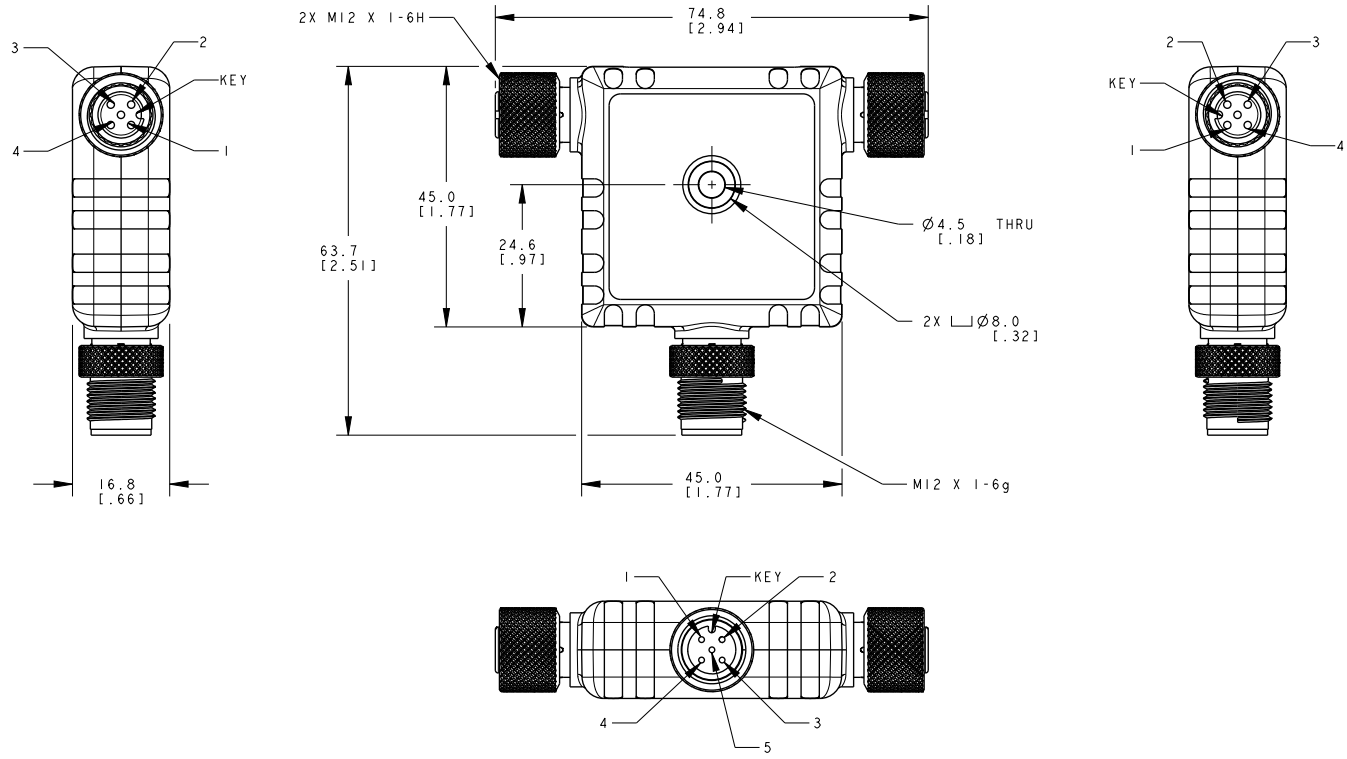
Digital Inputs (SIO [DI] Mode)
Input Current: 5 mA typical
ON Voltage/Current: 15 V DC minimum/5 mA minimum
OFF Voltage: 5 V DC maximum

Digital Outputs (SIO [DO] Mode)
On-Resistance: 120 mΩ typical, 250 mΩ maximum
Current Limit: 0.7 A minimum, 1.0 A typical, 1.3 A maximum
Off Leakage Current: -10 µA minimum, 10 µA maximum

Certifications

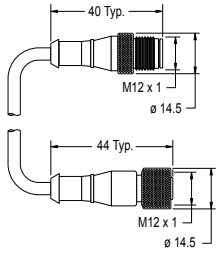
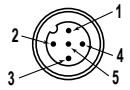
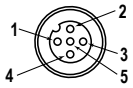
Dimensions

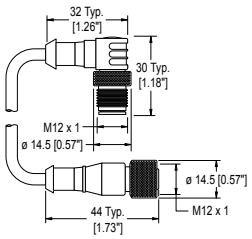
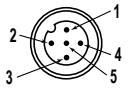
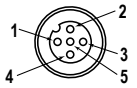
All measurements are listed in millimeters [inches], unless noted otherwise.

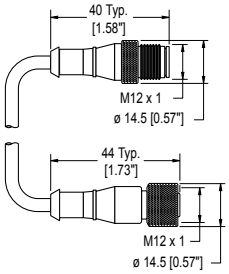
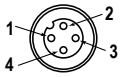
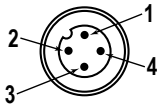
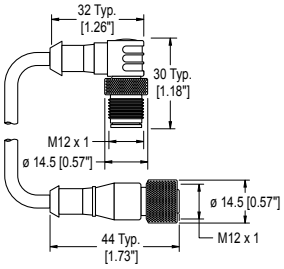


Accessories

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)				
MQDEC-515SS	5 m (16.4 ft)				
MQDEC-530SS	9 m (29.5 ft)				
MQDEC-550SS	15 m (49.2 ft)				

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

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)			
MQDEC-403RS	0.91 m (2.99 ft)	Male Right-Angle/ Female Straight		
MQDEC-406RS	1.83 m (6 ft)			
MQDEC-412RS	3.66 m (12 ft)			
MQDEC-420RS	6.10 m (20 ft)			
MQDEC-430RS	9.14 m (30.2 ft)			
MQDEC-450RS	15.2 m (49.9 ft)			
MQDEC-403RR	0.9 m (2.9 ft)	Male Right-Angle/ Female Right-Angle		
MQDEC-406RR	1.8 m (5.9 ft)			
MQDEC-412RR	3.6 m (11.8 ft)			
MQDEC-420RR	6.1 m (20 ft)			

Maintenance and Service

Do not use alcoholic cleaning agents. The R45C 2-Port Converter is maintenance-free.

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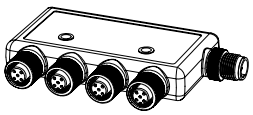
For patent information, see www.bannerengineering.com/patents.

R90C-4K-MQ IO-Link Master/Modbus Converter

Datasheet



- Connects four IO-Link devices and provides access via Modbus RTU interface
- Rugged design; easy installation with no assembly or individual wiring required
- 5-pin M12 male quick disconnect connector
- Four 4-pin M12 female quick disconnect connectors
- Built-in indication for four IO-Link master ports
- Built-in indication for Modbus RTU connection status
- Rugged over-molded design meets IP65, IP67, and IP68

Models

Housing	Function	Converter	Connection	Connector
R90	C	4K	M	Q
	C = Converter	4K = 4-port IO-Link Master (female)	M = Modbus Slave Connection (male)	Q = M12 Integral Quick Disconnect

Overview

The R90C 4-Port Converter connects to four IO-Link devices and provides access to IO-Link data and functionality via a Modbus RTU connection.

Modbus registers allow for access to both IO-Link devices and their functions:

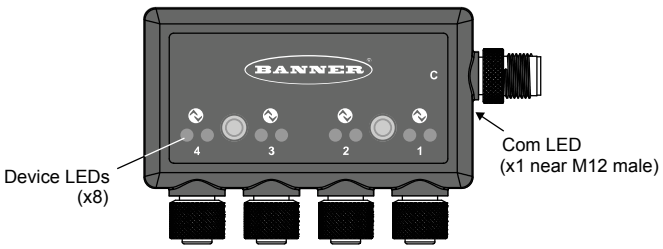
- Process Data In
- Process Data Out
- Connected device information
- ISDU data
- Discrete I/O configuration
- IO-Link events
- Data storage
- SIO mode

For more information, see p/n 221399 *IO-Link to ModBus Converter - Device Register Map*.

Status Indicators

The R90C-4K-MQ IO-Link Master/Modbus Converter has matching RGB LED indicators on both sides for each IO-Link device port to allow for installation needs and still provide adequate indication visibility. There is also an Amber LED indicator on both sides of the converter, which is specific to the Modbus communication.

Figure 1. R90C 4-Port Converter status indicators – front and back



IO-Link Device Port 1, 2, 3, and 4 RGB LEDs	
Indication	**Status**
Off	Deactivated port
Flashing Green	Waiting for IO-Link device
Solid Green	IO-Link device is connected
Flashing Red	Validation Error
Solid Yellow	Signal high in SIO-mode
Solid Blue	Processor communication error

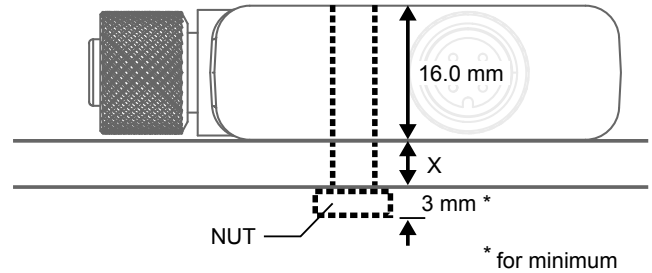
Modbus Communication Amber LED	
Indication	**Status**
Flashing Amber (4 Hz)	Modbus communications are active
Solid Amber (2 seconds) to Off	Modbus communications are lost after connection
Solid Amber (2 seconds) to Flashing Amber (4 Hz)	Modbus communications momentarily lost, but then reestablished
Solid Amber	Modbus communications are intermittent, or communications error occurs more frequently once every 2 seconds
Off	Modbus communications are not present

Installation Instructions

Mechanical Installation

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

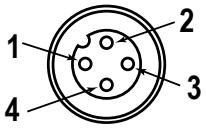
All mounting hardware is supplied by the user. Fasteners must be of sufficient strength to guard against breakage. Use of permanent fasteners or locking hardware is recommended to prevent the loosening or displacement of the device. The mounting hole (4.5 mm) in the R90C 4-Port Converter accepts M4 (#8)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

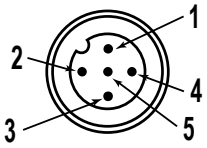


Screw Length = 16.0 mm + “X” mm + 3 mm

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

Wiring

Port 1, 2, 3, and 4 – Female	Pin	Signal Description
	1	18 V DC to 30 V DC
	2	I/Q (digital in-out)
	3	Ground
	4	C/Q (communications/digital in-out)

Comm Port – Male	Pin	Signal Description
	1	18 V DC to 30 V DC
	2	RS485/D1/B/+
	3	Ground
	4	RS485/D0/A-
	5	Banner 1-wire

Specifications

Voltage Input Range
18 V DC to 30 V DC

Input Power
24 V DC at 4 A

Output Power
24 V DC at 100 mA + 200 mA/port = 900 mA maximum

Supply Protection Circuitry
Protected against reverse polarity and transient voltages

Leakage Current Immunity
400 µA

Indicators
RGB1: IO-Link Port 1 Status
RGB2: IO-Link Port 2 Status
RGB3: IO-Link Port 3 Status
RGB4: IO-Link Port 4 Status
Amber: Modbus Communications

Connections
(4) Integral 4-pin M12 female quick disconnect
(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)

Environmental Ratings
For Indoor Use Only
IP65, IP67, IP68, UL Type 1

Operating Conditions
–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)

IO-Link Baud Rates
COM1: 4.8 kbps
COM2: 38.4 kbps
COM3: 230.4 kbps

Compliant Standards
IO-Link interface and System Specification v 1.1.2
IO-Link Test Specification v 1.1.2

Master Communication Protocol
RS485 – Modbus RTU

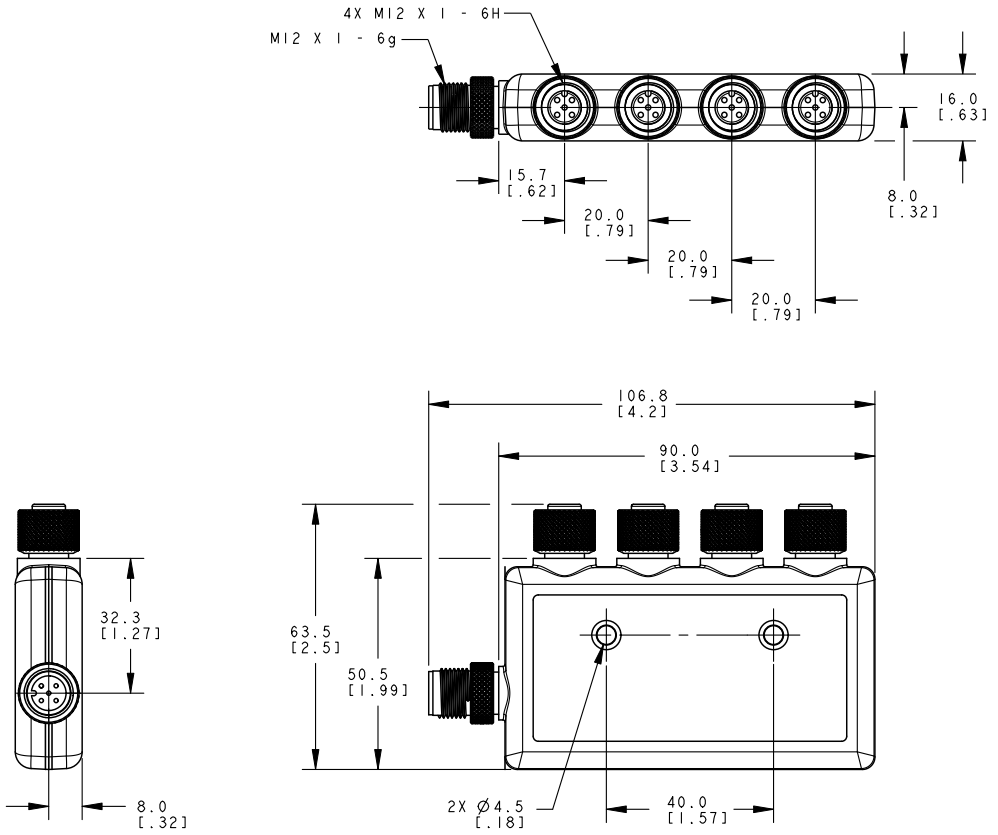
Digital Inputs (SIO [DI] Mode)
Input Current: 5 mA typical
ON Voltage/Current: 15 V DC minimum/5 mA minimum
OFF Voltage: 5 V DC maximum

Digital Outputs (SIO [DO] Mode)
On-Resistance: 120 mΩ typical, 250 mΩ maximum
Current Limit: 0.7 A minimum, 1.0 A typical, 1.3 A maximum
Off Leakage Current: -10 µA minimum, 10 µA maximum

Certifications

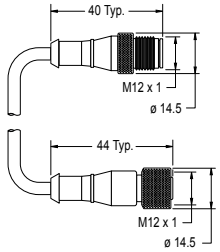
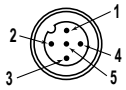
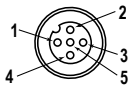
Dimensions

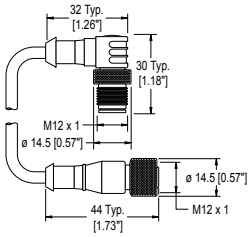
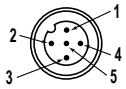
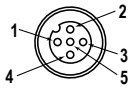
All measurements are listed in millimeters [inches], unless noted otherwise.

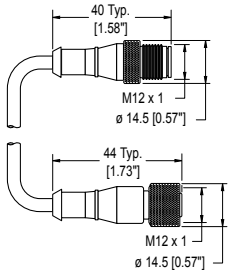
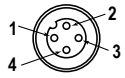
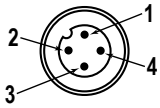


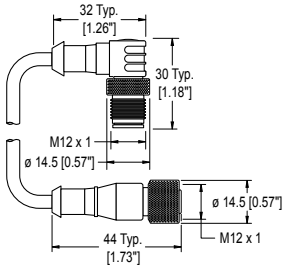
Accessories

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)				
MQDEC-515SS	5 m (16.4 ft)				
MQDEC-530SS	9 m (29.5 ft)				
MQDEC-550SS	15 m (49.2 ft)				

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

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)			

4-Pin Threaded M12 Cordsets—Double Ended				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-403RS	0.91 m (2.99 ft)	Male Right-Angle/ Female Straight		
MQDEC-406RS	1.83 m (6 ft)			
MQDEC-412RS	3.66 m (12 ft)			
MQDEC-420RS	6.10 m (20 ft)			
MQDEC-430RS	9.14 m (30.2 ft)			
MQDEC-450RS	15.2 m (49.9 ft)			
MQDEC-403RR	0.9 m (2.9 ft)	Male Right-Angle/ Female Right-Angle		
MQDEC-406RR	1.8 m (5.9 ft)			
MQDEC-412RR	3.6 m (11.8 ft)			
MQDEC-420RR	6.1 m (20 ft)			

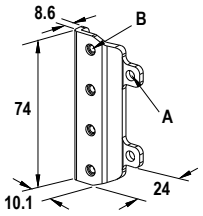
Brackets

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



Maintenance and Service

Do not use alcoholic cleaning agents. The R90C 4-Port Converter is maintenance-free.

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